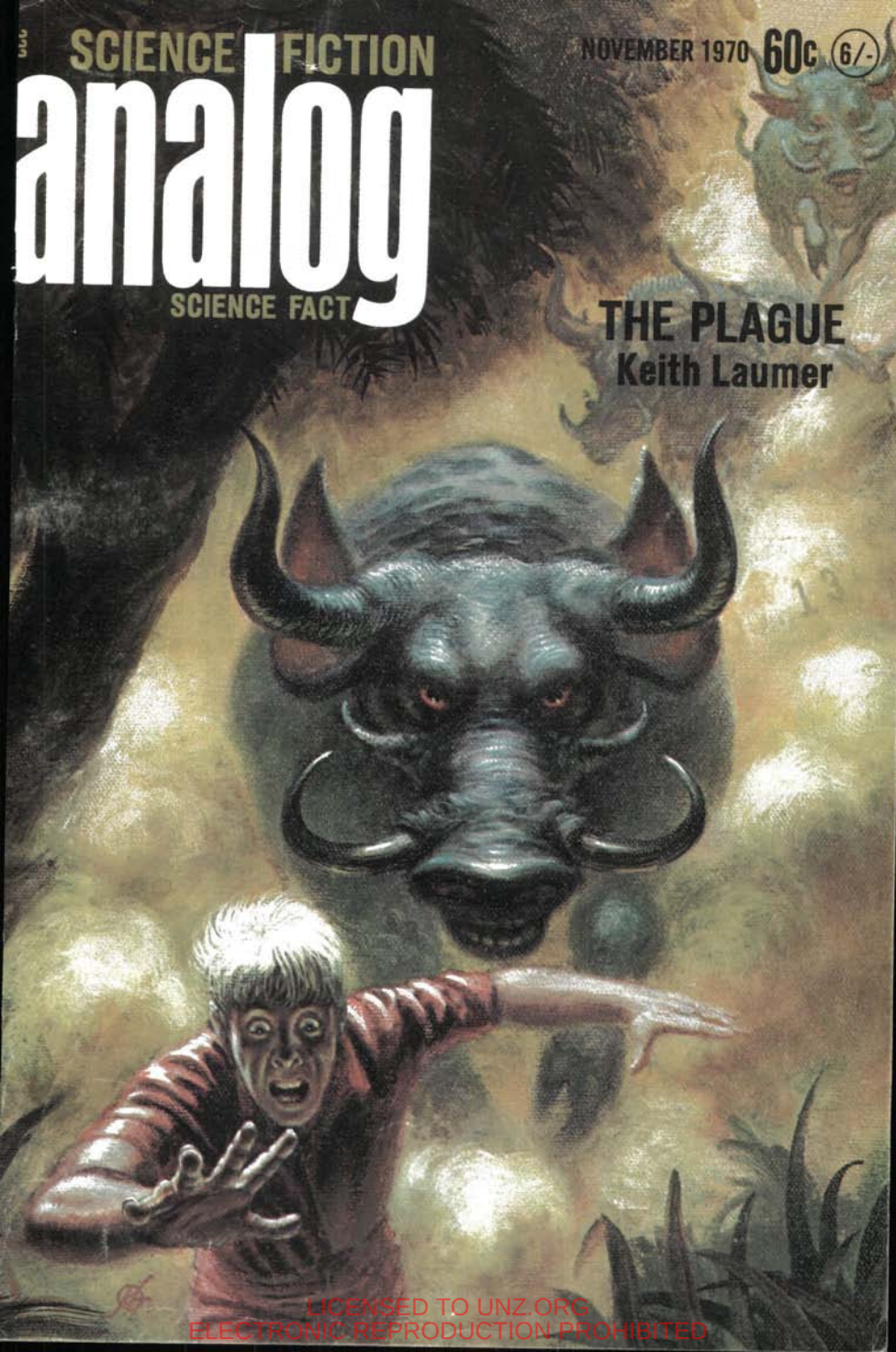


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# the NOW generation

*an editorial by John W. Campbell*

Psychologists talk a lot about "security," and how important that is in developing a sound personality—but if there's anything a psychologist hates, it seems to be the insecurity he feels when someone asks him to define his terms. Apparently psychology and semantics are not good friends.

It's obvious that true, absolute "security" is impossible; there can be no absolute guarantee of life, liberty and the pursuit of happiness. After all, there are things ranging from supernova explosions down through meteor impacts, earthquakes, lightning and automobile accidents. True and absolute security is nonexistent. So . . . what does a psychologist mean?

I don't know, of course; I'm not a psychologist. But I do have a working definition that seems to me to apply to human beings.

Instead of talking about "security," an unattainable absolute, let's discuss a "*sense* of security" which is, after all, what the human being reacts to anyway—his *belief* of what-is rather than the theoretical absolute of what-is.

An individual—child or adult—has a *sense* of security when he *believes* he knows how to handle any problem that may come up. I.e., that no matter what happens, he knows how to cope with the situation. For a primitive savage, this may stem largely from the ju-ju he got from the tribal witch doctor; it gives him the courage and strength and peace of mind to make his life effective and outgoing. For the child, the sense of security stems from the knowledge that menacing problems he can't take care of himself can be handled by howling "Daddy! Daddy!"

The most frustrating situations for the child are those in which Daddy says "You'll have to wait," for some reason or another. For a year-old child, one year is a lifetime. For a two-year old, a year is half a lifetime. The scale of time as seen by children is a darned sight different from that of an adult; they have a tremendous urge for immediate response.



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And that, of course, becomes one of the major problems that must be handled; the child must find ways to make Daddy respond *immediately*—not after he finished the evening paper, or as soon as he's finished putting up the storm windows. *Now*, when the response is *needed*.

This attitude diminishes, but does not vanish, as the child becomes a teen-ager; it shifts around a bit, but remains largely intact so long as the basic problem-handling mechanism of howling "Daddy!" remains as a primary problem-solving technique. The same sense of impatience and frustration remains, still focused on Daddy's failure to respond immediately, so long as they remain convinced that problems are to be solved by demanding that Daddy do it for them.

In the late teens and early twenties, they call Daddy "the Establishment," and are furious that the establishment is just as wickedly remiss in its failure to respond *immediately* to their demands as Daddy was when he had the storm windows to put up.

They call themselves the Now Generation, and they have every right to the title—they want what they want and they want it *now*, and somebody better get on the stick and get it for them!

Like five-year-olds, the Now Generation goes in for destructive tantrums when it doesn't get what it wants right away. It burns down buildings, sets up bomb factories, disrupts general operations, and in various ways displays tantrum behavior when they aren't getting exactly what they want when they want it.

They know the Establishment isn't listening to them, because the Establishment isn't doing, *immediately*, what they want. Any failure to do *exactly* what they want in exactly the way they want it, when they want it proves clearly that the Establishment is not listening to them at all. So naturally they aren't going to listen to the excuses and alibis and put-offs the Establishment tries to deceive them with.

The only proof that the Establishment is listening to them is when the Establishment immediately does exactly what they want. Anything else proves that the Establishment did not listen at all.

Any one who's had to deal with a frustrated five-year-old knows the behavior pattern. If Junior was told he could go to the beach next Saturday, and next Saturday turns out to be a raw, chill, blustery day with a pouring rain, these feeble excuses for not doing what he wants are brushed aside with the contempt they deserve.

At ten, the pattern's in full swing also. Mary wants a riding horse; the fact that the family lives in a dense suburb, where housing and maintaining a horse is outrageously expensive, is a mere shilly-shallying



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excuse for rejecting something that is *relevant* and *important* to living. If Daddy was really listening, he'd realize that with a horse, the family wouldn't need a car, and that would save a lot of money.

The essence of the pattern stems from the insistence that Daddy—or the Establishment—*could* do it, and do it quickly, if it just *would*.

The great difficulty stems from this fact: During childhood, the individual has two roads to solving a problem.

1. He can work at the problem and solve it by his own efforts.
2. He can work on Daddy until he gets Daddy to solve the problem for him.

This second path always assumes that Daddy can solve any problem, if he can just be made to buckle down and do it as he should. It's sometimes hard getting the Old Man to accept the necessity of doing things—he just doesn't understand the importance and relevance of these things until Junior works him over for a while. Like how critically important it is that Junior have a set of wheels to get to High School, even if the family car does need replacement; after all, it still runs, doesn't it?

This same concept—that the Establishment could solve any problem Junior assigns it, if it just would—underlies their thinking. This makes it clear to them that the only real problem is working out a way to make the Establishment do what they know perfectly well it could do if it just buckled down and did it.

One of the obvious things that the Establishment should take care of, and right now, is this matter of poverty. Obviously, that can be solved readily enough; all it takes is money!

I doubt that anyone will ever know who first said "The Poor we have always with us," but it must have been in a language long since lost in the mists of prehistory. Efforts to end the problem have been continued since, and whatever the solution may some future day turn out to be, giving money isn't it. The Now Generation has very little use for history, because that's *then* and things are *different* now. However they might try seeing how much fundamental change there's been in human behavioral mechanisms; the clothing styles, the business styles, and the languages may change; they may ride automobiles instead of walking, but the fundamental motivational patterns don't seem to alter very markedly.

And one thing history says very, very clearly and definitely is that giving money does not end poverty.

Increased technology and greater understanding of the laws of Nature and the Universe have reduced the degree of poverty to an unprecedented degree.

And that's why the Now Generation is so insistent that we should stop wasting money on space flight



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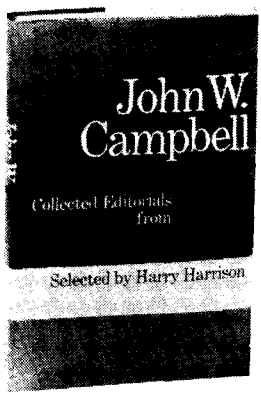


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and government-supported research and spend it on poor people. Don't let the money get into the hands of brilliant people who will use it as a tool to create new levels of technology that can feed, house, clothe and cure people—give it to people who will dissipate it. The noncreative deserve it, because they can't/won't build anything for themselves.

High-level technology is the first human effort in history that has improved the lot of the poor appreciably.

So the wise, far-seeing Now Generation wants the Establishment's efforts diverted from that—which has worked to help—to the ancient, tried-and-obvious method of giving away money—the method that's been tried out again and again and again through the weary, repetitious cycles of history.

No wonder history bores people so; it's so repetitious.

Incidentally, "The Establishment" is, of course, the Now Generation's opprobrious term meaning "our cultural pattern"—the nasty, wicked, bad cultural pattern that built all the things like TV, hi-fi, wheels, and planes they find so satisfying.

*continued on page 176*



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# THE PLAGUE

*The most dangerous type of plague is one that destroys the basic ecology of a region.*

**KEITH LAUMER**
*Illustrated by David Cook*

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The man faced the monster at a distance of twenty feet.

Dr. Reed Nolan, khaki-clad, gray-haired, compactly built, dark-tanned by the big sun of the world called Kaka Nine, hardly would have been recognized by his former colleagues at the university where he had spent the earlier decades of his life.

The creature confronting him would have been even less familiar. Massive as a rhino, horned, fanged like a warthog, with a mottled hide and slim, curiously jointed legs, the tusker lowered its head and gouged at the turf.

"Well, Emperor," Nolan said genially, "you're here early this year. That's fine; I have a lush crop of pestweed for you. I guess the herd's not far behind you." He plucked a stalk of wild-growing leatherplant, stripped off the tough husk, offered the succulent pith to the beast. The native omnivore ambled forward, accepted the offering, regarding the man with the same tolerance it did any other nonnutritive substance.

At their first encounter, three years before, Nolan had had a few bad moments when the tusker herd had arrived like a sudden plague, charging down from the hills. The big beasts had sniffed at his heels where he roosted in the only perch available: a stunted tree from which the monster could have plucked him easily had it been so minded. Then they had passed on. Now, better educated, Nolan was deeply appreciative of the thoroughness with which the big animals rooted out the native plant and rodent life from his fields and the scrupulous care with which they avoided any contact with the alien Terrestrial crops. As self-maintaining cultivators, weeding machines, and fertilizer spreaders, the tuskers left little to be desired.

The communicator at Nolan's wrist buzzed softly.

"Reed, there's a surface boat in the lagoon," a woman's voice said, rather excitedly. "Quite a big boat. Who do you suppose it could be?"

"In *our* lagoon, Annette? Beats me. I'm in the high pasture, over beyond North Ridge. I'll buzz over and have a look. By the way, Emperor's here; the herds ought to be along in another week."

Nolan remounted his soft-wheeled range cart and trundled upslope to a point from which he had a wide view of the planted fields and seedling orchards sweeping down toward the mile-distant beach and the island-dotted sea beyond. The boat was a few hundred yards offshore, obviously making for the landing wharf Nolan had completed the previous month. It was a big, wide, gray-painted vessel, clumsy but powerful looking, riding low in the water. Annette heard his grunt of surprise.

"Maybe we're on the tourist routes now. Take it easy, girl. Don't start rushing around making



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sandwiches. It's probably some kind of official survey party. I can't think of anyone else who'd have an interest in our homestead."

"What are they doing out here, twelve hundred miles from Toehold? The Bureau's never paid us any attention before."

"For which we're duly grateful. Never mind; I'm on my way down. Maybe it will be nice to talk to strangers, after three years."

It was a fifteen-minute trip down from the heights to the hedge line delineating the limits of the tilled acreage. The perfume of the force-grown gardenias was sweet on the air. For all their beauty, the imported plants were no luxury; Nolan had discovered early that their fragrance was an effective deterrent to the tuskers. The hedge system had been laid out with care to channel the big animals' seasonal migration—stampede might be a better word, Nolan reflected—as they swept down from the winter heights to graze their traditional meadows along the shore—meadows now under intensive cultivation. The herds, Nolan admitted to himself, had probably made the difference between bare survival and the success of the plantation.

Timmy, Nolan's twelve-year-old son, met him on the path above the house. Nolan let him hop aboard.

"They're tying up at the pier, Dad," the boy said excitedly. "Who do you s'pose they are?"

"Probably some junketing bureaucrats, Timmy. Taking a census, or something of the sort."

There were men down on the pier now, making cables fast. The sound of a turbine started up. A tracked vehicle, bright yellow in color, was trundling down the gangplank.

Annette, a petite brunette, emerged from the house to meet her husband and son.

"They look awfully busy," she said, glancing toward the shore. "Reed, did you order any equipment that I don't know about?"

"Nothing. Someone's made a navigational error, I suspect."

"Dad, look!" Timmy pointed.

A deck boom, probing in an open hatch, had lifted a laden pallet, swung it over the side to deposit it on the dock. A fork lift picked up the pallet, advanced along the length of the pier; it rolled off onto the grassy shore, gouging deep parallel ruts through the planted turf as it went.

"Dad, we spent all spring getting that grass to grow—"

"Never mind, Timmy, we can replace it. You two stay here," Nolan said to Annette. "I'll go down and see what this is all about."

"Aren't you going to wash up, Reed? They'll think you're the hired man."

"Don't I wish I had one," he said as he headed for the dock.

The path down from the crest where he had built the house led



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close under a dense stand of blue-needled sprucelike trees. Native wildflowers in many shades of yellow grew in profusion here; a stream splashed down across gold-mossed rocks. The Terrestrial birds that Nolan had released—and fed daily—had thrived: mockingbirds, robins, and parakeets chirped and twittered comfortingly in the alien shade of the forest. Next year, he might be able to bring in a few dozen seedlings of pine and cedar to supplement the native woods, since this year's crops would, for the first time, show a handsome profit.

As Nolan emerged from the shelter of the trees the vehicle he had seen earlier was churning briskly across the grass in his direction. It halted and a bulky bundle tumbled from it to the ground. The machine drove on, dropped a second package fifty feet from the first. It continued on its way, depositing the loads at regular intervals across the wide lawn. Nolan angled across to intercept the vehicle as it stopped again. Two men, one youngish, with a thinning crew cut, the other middle-aged and bald, both dressed in badly cut but new-looking coveralls, looked down at him without visible interest.

"Better hold it, fellows," Nolan called. "There's been some mistake. That cargo doesn't belong here."

The men exchanged glances. The elder of the two turned and spat carelessly past Nolan.

"Ha," he said. The vehicle moved on.

Nolan walked over to the nearest bundle. It was a tailored plastic casing, roughly cubical, two feet on a side. Markings stenciled on the side read:

SHELTER,
PERSONNEL (MALE)
cat 567/09/a10
CAP 20. APSC. CL II.

Nolan continued down to the pier. Vehicles were rolling off it in a steady stream, some loaded with men, others with equipment. The growl of turbines filled the air, along with an acrid stink of burned hydrocarbons. A small, slender man in sub-executive coveralls stood amid the confusion, clipboard in hand. He looked around sharply as Nolan came up.

"Here," he snapped, "what are you doing here, fellow? What's your crew and unit number?" He riffled the papers on the clipboard as if the answer to his question was to be found there.

"I was about to ask you the same thing," Nolan said mildly. "What you're doing here, I mean. I'm afraid you're in the wrong place. This is—"

"None of your impertinence, now! Stand over there; I'll get to you presently." The small man turned his back to Nolan.

"Where can I find the man in charge?" Nolan asked. The man ignored him. He turned toward the



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boat; the little man shouted after him, but he went on.

At the pier, a harassed-looking fellow with a tight, office-pale face stared him up and down.

"In charge?" he echoed Nolan's inquiry. "Don't worry about it. Get back to your crew."

"I'm not a crew member," Nolan said patiently. "I'm—"

"Don't argue with me!" the man snapped, and motioned to a bigger man overseeing the maneuvers of the fork lift. "Grotz, take his number." He turned away.

"All right, you, let's have that number," Grotz demanded tiredly.

"Number one," Nolan said.

"One what? One ten?"

"If you say so."

"All right." Grotz jotted. "They were looking for you, one-ten. Better get busy before I dock you."

"I think I'll do just that," Nolan said, and left the pier.

Back at the house, he went directly to the study, switched on the callbox.

"Some kind of official snafu," he told Annette. "I'll have to place a call to Toehold and see what they know about it."

"Reed—that's so expensive . . ."

"Can't be helped. They seem to be too busy to talk to me." Nolan looked up the code for the Office of Colonial Affairs, punched it out.

"Reed," Annette said from the window. "They're putting up some big tents on the lawn!"

"I know . . ." An operator came on the line; another minute passed before Nolan reached the OCA.

"Nolan, you say?" a harassed official voice said. "Oh, yes, I recall the name . . ."

Briefly, Nolan outlined the situation. "Someone's apparently got his coordinates confused," he finished. "If you'd put a call through on the IC band to whoever's in charge—"

"Just a minute, Nolan. What was the number of the boat again?"

Nolan told him.

"Just a moment. Ah, yes. I see that the vessel is chartered to the Union for Human Privileges. They're only semiofficial, of course—but they're a powerful organization."

"Not powerful enough to legally pitch camp on my land," Nolan said.

"Well . . . I think it's more than a camping trip, Mr. Nolan. The UHP intends to set up a permanent relocation facility for underprivileged persons displaced by overcrowding from the Welfare Center."

"On *my* claim?"

"Well, as to that, your claim isn't actually finalized, you realize. The five-year residency requirement hasn't yet been fulfilled, of course if . . ."

"Nonsense. That approach wouldn't hold up in court for five minutes!"

"Perhaps—but it might be some



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years before the case appeared on the agenda. Meanwhile . . . well, I'm afraid I can't offer much encouragement, Mr. Nolan. You'll just have to adjust."

"Reed!" Annette gasped. "There's a man with a power saw; he's cutting down one of the sycamores!"

As Nolan turned to the window a black-painted personnel car pulled to a stop outside. The hatches popped up. Four men, a stout woman, and a lath-thin youth stepped down. A moment later Nolan heard the front door open. A short, heavily-built man with bristly reddish hair strolled into the front hall, his retinue close behind him.

"Well, a fortunate find," a voice said. "The structure seems sound enough. We'll establish my administrative HQ here, I think. And you can prepare personal quarters for me as well; much as I'd prefer to share issue accommodations with our people, I'll need to remain close to affairs."

"I think there's ample room for all the staff here, Director Fraswell," another voice said, "if we make do with a room apiece . . ."

"Don't be afraid to share a little hardship with the men, Chester." The man called Fraswell cut off his subordinate's remark curtly. "I'll remind you . . ." He broke off abruptly as he caught sight of Nolan and Annette.

"Who's this?" the plump man barked. He had a mottled complexion and a wide, unsmiling mouth. He turned to the man beside him. "What's this fellow doing here, Chester?"

"Here, who're you?" A lean, bony man with a crooked face spoke sharply, coming forward from behind his chief.

"My name is Nolan—"

"Get his crew number," a third man spoke up.

"Here, fellow, what's your number?" the crooked-faced man said quickly.

"Who's the woman?" the plump man barked. "I made it clear there was to be no fraternization!"

"Get the woman's number," Chester said sharply.

"All right, crew and unit numbers," the man in the rear rank said, coming forward. "Let's see your wrists, both of you."

Nolan stepped in front of Annette. "We don't have numbers," he said. "We're not in your party. We live here. My name is Nolan—"

"Eh?" The plump man interjected in elaborate puzzlement. "*Live* here?"

"Live *here*?" his aide echoed.

"That's right. That's my dock you tied up to. This is my house. I now . . ."

"Oh, yes." The plump man nodded, making a show of recalling a trivial datum. "You're the fellow . . . what's his name, . . . ah, Nolan. Yes. I was told you had estab-



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lished some sort of squatter's claim here."

"My claim is on file at Toehold, ten copies, notarized and fees paid. So I'd appreciate it if you'd load your property back aboard your boat and take another look at your charts. I don't know where you were headed, but I'm afraid this spot's taken."

The plump man's face went expressionless. He looked past Nolan's left ear.

"I've requisitioned this site for the resettlement of a quota of economically disadvantaged persons," he said solemnly. "We constitute the advance party, to make ready the facilities for the relocatees who're to follow. I trust we'll have your full cooperation in this good work."

"The facilities as you call them, happen to be private property—"

"You'd prate of selfish interests with the welfare of hundreds at stake?" Fraswell barked.

Nolan looked at him. "Why here?" he asked levelly. "There are thousands of unoccupied islands available—"

"This one seems most easily adaptable for our purposes," Fraswell said flatly. "I estimate a thousand persons can be accommodated here quite nicely . . ."

"It's no different than any other island in the chain."

Fraswell looked surprised. "Nonsense. The cleared land along the shore is ideal for erection of the initial campsite; and I note various food plants are available to supplement issue rations."

A man in a clerical collar came into the room, rubbing his hands. "A stroke of luck, Director Fraswell," he cried. "I've found a supply of non-issue foodstuffs, including a well-stocked freezer . . ." He broke off as he saw Nolan and Annette.

"Yes, yes, Padre," Fraswell said. "I'll conduct an inventory and see to an equitable distribution of items found."

"Found—or stolen?" Nolan said.

"Whaaat?"

"Why can't these deserving cases of yours produce their own supplies? The land's fertile enough for . . ."

The cleric stared. "Our people are not criminals, condemned to hard labor," he said indignantly. "They're merely disadvantaged. They have the same right to Nature's bounty as yourself."

"Aren't you missing the distinction between Nature's bounty and the product of human effort? There's an ample supply of Nature on the next island. You have plenty of labor available. If you take virgin land, in a year you can harvest your own crop."

"You expect me to subject these unfortunate people to unnecessary hardships, merely out of your personal selfishness?" Fraswell snorted.



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"I cleared land; they can start off the same way I did—"

"My instructions are to establish my group at a certain standard; the more quickly that standard is reached—"

"The better you'll look back at HQ, eh?"

A woman had followed the cleric into the room. She was thick-necked, red-faced, with grimly frizzed gray hair, dressed in drab-colored clothing and stout shoes. She looked indignantly at Nolan.

"The land and what's on it belongs to everyone," she snapped. "The idea, one man trying to hog it all! I guess you'd just set here in luxury and let women and children starve!"

"I'd let them clear their own land and plant their own crops," Nolan said gently. "And build their own headquarters. This happens to be my family's house. I built it—and the power plant, and the sewage system . . ."

"Wonder where he got the money for all that," the woman wondered aloud. "No honest man has that kind of cash."

"Now, Milly," Fraswell said indulgently.

"I saved eighty credits per month for twenty-seven years, Madam," Nolan said. "From a very modest salary."

"So that makes you better than other folk, eh?" She pursued the point. "Can't live in barracks like everybody else—"

"Now, Miltrude," Fraswell said mildly, and turned back to Nolan.

"Mr. . . . ah . . . Nolan, inasmuch as I'll be requiring information from you as to various matters, you may as well be assigned a cot here at HQ. I'm sure that, now you've considered it, you'll agree that the welfare of the community comes first, though modest personal sacrifices may be required of the individual, eh?"

"What about my wife?"

Fraswell looked grave. "I've ordered that there'll be no sexual fraternization for the present—"

"How do *we* know she's your wife?" Miltrude demanded.

Annette gasped and moved closer to Nolan; the crooked-faced man caught at her arm. Nolan stepped forward and knocked it away.

"Oh, violence, eh?" Fraswell nodded as if in satisfaction. "Call Grotz in." Chester hurried away. Annette clutched Nolan's hand.

"It's all right," he said. "Fraswell knows how far he can go." He looked meaningfully at the plump man. "This isn't an accident, is it?" he said. "I suppose you've had your eye on our island for some time; you were just waiting until we had it far enough along to make it worth stealing."

The big man from the boat came into the room, looking around. He saw Nolan.

"Hey, you—"

Fraswell held up a hand.

"Now, Nolan—there'll be no



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more outbursts, I trust. As I say, you'll be assigned quarters here at HQ provided you can control yourself."

A lanky, teen-age lad with an unfortunate complexion sauntered in through the open door. He had a small, nearly ripe tomato in his hand, from which he had just taken a bite.

"Look what I found, Pop," he said.

"Not now, Leston," Fraswell barked. He glared until the lad shrugged and departed. Then he looked alertly at Nolan.

"Tomatoes, eh?" he said thoughtfully. "I thought they couldn't be grown here on Kaka Nine."

"Just one experimental plant," Nolan said grimly. "Leston seems to have terminated the experiment."

Fraswell grunted. "Well, have I your word, Nolan?"

"I don't think you'd like the word I'm thinking of, Mr. Fraswell," Nolan said.

"Pah!" the director snorted. "Very well, then." He eyed Nolan severely. "Don't say I didn't give you every consideration! Grotz—Chester—take them away and lock them up somewhere until they see reason."

In the dark of the tool shed where he had been confined, Nolan massaged his bruised knuckles and listened to the soft sigh of the wind, the lonely call of the native night birds—and to a stealthy, persistent rasping, barely audible, coming from beyond the locked door across the small room.

The sound ceased with a soft clank of metal. The knob turned; the door swung inward. Through the opening, a youthful face appeared.

"Tim! Nice work!" Nolan breathed.

"Hi, Dad!" The boy slipped through, closed the door. Nolan held out his wrists, linked by braided steel a quarter-inch in diameter. Timmy clamped the bolt cutter on the cable, snipped through the strands.

"My ankle is cuffed to the cot," Nolan whispered.

Timmy found the cable, cut it deftly. A moment later, Nolan and his son were outside. All was silence, though there were still a few lights in the upper rooms of the house, and down by the dock side.

"Your mother?" Nolan said as they moved off.

"They've got her in the last tent in line—down by the pond. Dad, you know what they did? They used a net and took every fish out of the pond! All our panfish and bass fingerlings! They cooked 'em up and ate 'em."

"They can be replaced—in time."

"They sure smelled good," Tim admitted.

"You had anything to eat?"



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"Sure. I raided the kitchen while that fat man with the funny lips was trying to figure out how to work the tricordeo. All he could get was the ref patterns. He was pretty mad."

They passed behind the ranked tents. A light burned in one.

"That's where the honchos stay," Tim said.

"No sentries?" Nolan asked.

"Nope. They talked about it and decided they didn't need any."

They were behind the last tent in line.

"About here," Tim said, indicating a spot six paces from the corner. "I saw Mom just before they opaqued it."

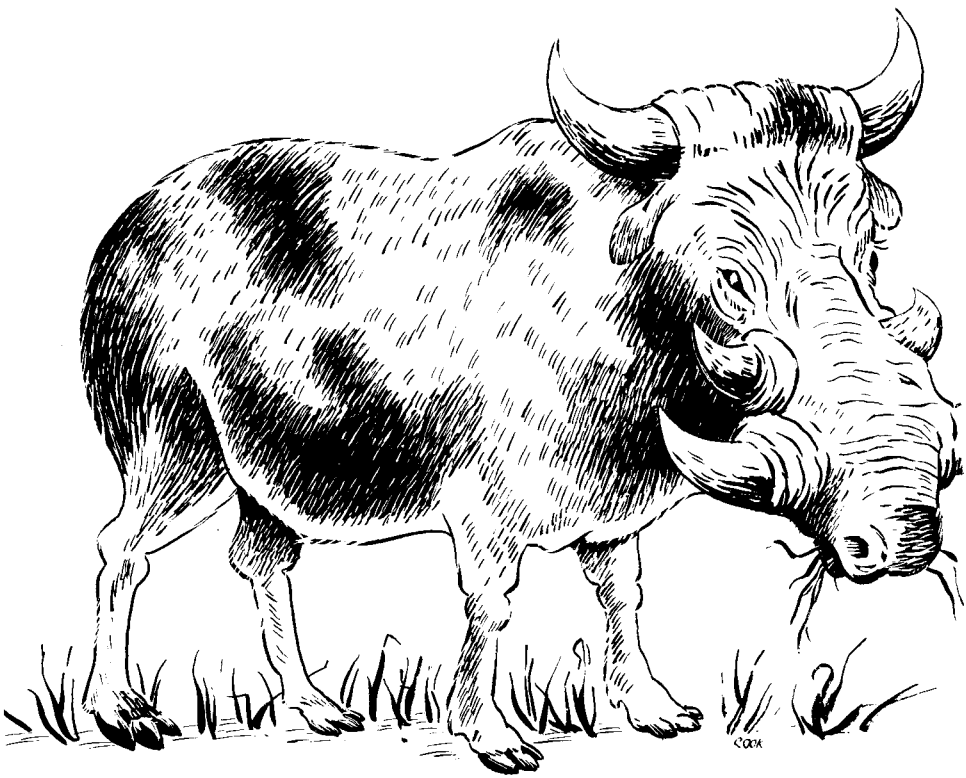
"I'll take the knife," Nolan said. "You move back and be ready to run for it if there's an alarm."

"Heck, Dad—"

"So you can try again, if they catch me."

"Oh. O.K."

Nolan worked the knife point through the tough material. Air hissed out. He ripped upward. From inside the tent there was a sharp exclamation, followed by a muffled thud. He thrust the cut



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flap aside and plunged through.

Annette met him.

"I knew you'd come," she whispered, and kissed him swiftly. "I had to hit her over the head." She nodded toward a bulky figure slumped at her feet.

"Timmy's outside," Nolan whispered as he passed her through the breach in the fabric wall.

Already the taut plastic had begun to sag.

"Patching goo," the boy said, and handed Nolan a roll of wide tape. Quickly they sealed the opening.

"Where to first?" Tim asked.

"The house," Nolan said.

The back door was locked; Nolan keyed it open. Inside, he went silently to the den, selected two small handguns and a lightweight power rifle. In the kitchen, Annette had assembled a small heap of concentrates not yet looted from the stores. Tim came in from the tackle room with packs.

Back outside, Nolan posted his wife and son near the path leading to the hills and set off toward the powerhouse. Inside, he made certain adjustments; he locked the door behind him as he left. Moving on to the pump house, he closed two large valves, opened others. Last, he engaged the massive power lock on the equipment shed.

"That's about it," he said as he rejoined the others. "Let's go."

"If they hadn't showed up," Tim said as they set off up the steep path, "I guess we never would have taken that camping trip we're always talking about."

The cave was a large and airy one, with a narrow entrance well concealed from below by a rocky ridge, and a fresh-water spring that trickled at the rate of ten gallons per hour into a stone basin. It was a cave the Nolan family knew well; they had once lived in it for two months, until the first rooms of the house had been completed.

It was the work of an hour to sweep out the accumulated wind-blown rubbish, set up the inflatable cots, arrange the collapsible cooking equipment around the stone fireplace. By then the sun was coming up.

Nolan looked down across the stunted mountain growth toward the house far below. The binoculars showed a cluster of men around the pump house.

"They must have emptied the reserve tank already," he said.

"They'll just blow the door off the pump house, Reed," Annette said. "Won't they?"

"Maybe—if they have the right explosives. But they'll still have to know which valves to open."

"I feel pretty mean—cutting off their water supply."

"There's always the pond and buckets. They won't suffer—except for a few blisters."

Nolan and Tim spent most of the morning busy on the slopes. The tusker herds were gathering in



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the high meadows now; using binoculars, Nolan estimated their numbers at over ten thousand. They returned to the cave with a specimen bag filled with fossils, low-grade gemstones, and some new varieties of fungus to add to Tim's slide collection. Annette greeted them with hot soup and sandwiches.

Late in the afternoon they watched a party of men spread out and scour the underbrush near the house. After an hour or two the search petered out.

"I'll bet old Fatty's plenty mad by now," Tim said cheerfully. "I'll bet he still hasn't figured out the tricordeo."

The Nolans set out a board and played three-handed chidge until dinner time. Annette served recon chicken-and-chips. She and Reed had cold dehi-beer, Tim hot cocoa. Just after dusk, all the lights went off in the house and on the grounds below.

"I suppose we'll hear from Director Fraswell pretty early in the morning," Nolan said as they composed themselves for sleep.

Half an hour before dawn there was a soft *beep!* from the small black box beside Nolan's bed.

"Visitors," he said, checking the indicator lights that told him which of the sensors he and Tim had planted the previous day had been activated. "On the east trail. They didn't waste any time." He rose and donned the clean clothes Annette had run through the precipitator, picked up the power rifle.

"Dad, can I come?"

"Negative. You stay here with your mother."

"Reed . . . are you sure—"

"I'm not that bad a shot," he said, and grinned at her. "I'll be back for coffee."

It took Nolan ten minutes to reach the vantage point he had selected the previous day. He settled himself in a comfortable prone position, adjusted the sling, and sighted through the scope sight. Three men toiled upward on the trail. Nolan took aim at the rock wall ten feet above them and squeezed off a burst. Dust spurted. When he lowered his sights, the men were gone. He picked them up a quarter of a mile back downtrail, running for home.

Twice more that day the spotters Nolan had planted on the slopes signaled intruders; twice more a single warning shot sufficed to discourage them.

Late in the afternoon, a bucket brigade formed across the lawn far below, hauling water to the house. The men working on the powerhouse door gave up at twilight. A crew of men set about chopping wood to heap on the lawn for a bonfire.

"Reed—the baby peach trees, and the pecans, and the limes . . ." Annette mourned.

"I know," Nolan said tersely.



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They watched the fire for an hour before turning in.

It was mid-morning when the signaler beeped again. This time it was a party of three men. One of them, the man called Winston, whom Nolan had last seen with Fraswell, carried a white towel attached to a section of sapling—pecan, Nolan thought. They waited for a quarter of an hour at the spot marked by a small crater in the rockwall from Nolan's shot of the previous day. Then they advanced cautiously.

On a rocky ledge a hundred yards below Nolan's position, they halted. A shout rang faintly:

"Nolan! We wish to talk to you!"

He remained silent.

"Director Fraswell has authorized me to offer you leniency if you give yourself up now," Winston shouted.

Nolan waited.

"You're to come down at once," Winston resumed. "No criminal charges will be pressed, provided you cooperate fully henceforth."

Another minute passed in silence.

"Nolan, give yourself up at once!" the angry voice shouted. "Otherwise . . ."

A single shot rang out above Nolan. Instantly the men below turned and ran. Nolan looked up toward the cave. Annette, her back to him, stepped from behind the rocky barrier that concealed the entrance, a pistol in her hand. She turned and waved. Nolan climbed back up to her side.

"On the west trail," she said indignantly. "The idea—while they were parleying with you!"

"Never mind," Nolan said mildly. "They're just exploring their environment."

"I'm worried, Reed. How long can this go on?"

"We have food for a month or so. After that, maybe Tim and I will have to raid the larder again."

Annette looked worried but said nothing further on the subject.

For five days, while Nolan watched the unirrigated fields slowly fade and wilt, there were no further overtures from below. Then, in mid-morning of the sixth day a party of four set out from the house, advanced slowly up the east trail. One of the men was Fraswell, Nolan saw. A man in the rear carried what appeared to be a placard. When they paused for their first rest, the man turned the sign to face the heights, but Nolan was unable to make out the lettering at the distance.

"Watch the beepers," he told Annette and Tim. "I don't think that's the game this time, but they may have planted someone on another trail last night after dark." He descended to his lookout station below. Director Fraswell's red face was clearly visible at half a mile,



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even on low mag. Nolan was able to read the placard now:

NOLAN—WE MUST TALK

"Fraswell," Nolan called. "What is it you want?"

The plump man scanned the cliff above for a glimpse of Nolan.

"Show yourself!" he called. "I can't carry on a discussion with a disembodied voice!"

"Don't let me keep you."

"Nolan, in my capacity as a Field Director of the UHP I call on you to descend at once and cease this harassment!"

"My family and I are just taking a long-deferred vacation."

"You shot at my people!"

"If I had, I'd have hit them. I hold a Double Distinguished Marksman's rating. You can check that if you like."

"Look here, Nolan—you're deliberately withholding information essential to the success of this mission!"

"I think you're a little confused, Mr. Fraswell. I'm in no way connected with your mission. I paid my own way here—"

"I'm not concerned with that! It's your duty to serve the people—"

"Mr. Fraswell, I suggest you pack up your people and your equipment and move on to another piece of real estate, and I'll give you all the technical assistance I can in getting started."

"Would you attempt to bargain with the welfare of a thousand men, women, and children?"

"Not quite. I estimate you have about fifty men in your advance party."

"The relocatees will arrive in less than a fortnight! Unless you give up this dog-in-the-manger attitude at the expense of these poor, helpless souls, I won't be responsible for the outcome!"

"Wrong again, Mr. Fraswell. It's entirely your responsibility. I'm just curious as to what you plan to do after you've eaten all the seed corn and cleaned out my emergency reserves. Move on and loot somebody else? What happens when you run out of people to loot, Fraswell?"

"I'm not in the business of making predictions, Nolan! I'm concerned for the success of the present operation!"

"I suppose by the time you run out of goodies you'll be retired, eh? Meanwhile, if you get tired of hauling water and eating issue rations you can always leave, Mr. Fraswell. Tell your headquarters it didn't work; perhaps next time they'll supply you with some equipment of your own."

"The power is off! There's no water! My men can't start the vehicles! The crops are dying! I call on you to come down here and undo your sabotage!"

"The only sabotage I've seen is what your men have done to my lawns and orchards. We won't count the fishpond."

There was a two-minute silence



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during which the men below conferred.

"Look here, Nolan," Fraswell called, sounding reluctantly conciliatory, "I'll concede that, from a purely materialistic standpoint, it might be said you have some right to compensation. Very well. Though it means taking bread from the mouths of the innocent, I'll undertake to guarantee payment of the usual credit per acre—for the arable portions of the tract, of course. After survey."

"I paid a credit and a half an acre for the unimproved land, over five years ago—and I paid for all of it—mountains, desert—the whole island. I'm afraid your offer doesn't tempt me."

"You . . . you exploiter! You think you can victimize the ordinary man, but you'll see! They'll rise in their righteous wrath and destroy you, Nolan!"

"If they'd rise in their wrath and tackle that next island, they could have a quarter section cleared and ready for summer planting."

"You'd condemn these good people to inhuman hardship—for the sake of mere personal avarice! You'd deny them bread! You'd—"

"I know these good people, Mr. Fraswell. I tried to hire some of them when I was breaking ground here. They laughed. They're the untrainables, the unemployables. They've had a free ride all their lives. Now they're overflowing the trough. So you're trying to dump them on me to maintain. Well, I decline the honor, Mr. Fraswell. It looks as if they're going to have to go to work if they want to eat. By the way, what's *your* salary per annum?"

Fraswell made choking noises.

"One last thing, Fraswell," Nolan called. "My gardenia hedges; tell your men to leave them alone; you don't need firewood that badly, and the few steps it would save in coming and going up into the foothills isn't worth destroying them."

"Gardenias, eh? Mean a lot to you, do they? I'm afraid I'll have to use my own judgment regarding fuel sources, Nolan!" The director spun on his heel and walked away. One of his attendants turned to shake a fist upwards before disappearing down the trail.

That afternoon, Nolan saw a crew hard at work, leveling the hedges.

The following day, Tim hurried into the cave calling excitedly that the tusker herds had started to move down from the heights.

"I don't like it," Annette said as Nolan prepared to leave the cave. "You don't know what that terrible man is likely to do if he gets his hands on you."

"I have to give them fair warning," Nolan said. "I'll be all right. Fraswell's not going to let anything happen that might look awkward on his record."

"How come, Dad?" Tim said.



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"Why not let the tuskers surprise 'em? Maybe they'll scare 'em right off the island!"

"Someone could get hurt; they might panic and get trampled. And those horns are sharp."

"Sure, but—you could get hurt, too, Dad, if you try to get in their way! They're pretty hard to stop once they're running!"

"I'll be careful. Don't worry about me."

Nolan set off by the most direct route available: a near-vertical ravine, water-cut, too narrow and precipitate for a tusker, but just possible for an active man. In twenty minutes he arrived at the valley floor, winded and dusty, with scratched and bleeding hands. As he emerged from the tangle of underbrush at the cliff base, three men jumped him.

The house stank. Director Fraswell, somewhat leaner than when Nolan had last seen him, badly shaved, wearing rumpled, sweat-marked clothing, glared triumphantly across the former dining room table, now occupying the center of the living room and covered with papers and empty ration boxes.

"So you finally came to your senses, eh?" He paused to scratch under his left arm. "I suppose you'll expect to hold me to the bargain I proposed. Well, think again! You rejected my offer when I made it. Now suffer the consequences!" He shook his finger in Nolan's face.

Nolan's lip was split. His jaw was swollen painfully. His head ached.

"I didn't come here to bargain," he said. "I came to warn you—"

"You—warn *me*?" Fraswell jumped to his feet. "Listen to me, you arrogant little popinjay! I'll do the warning! I want the power plant in full operation in fifteen minutes from now! I want water flowing ten minutes after that! I want all facilities unlocked and the keys turned over to me before you leave this room!" He scratched furiously at his ribs.

"That would be quite a trick," Nolan said. "Even if I had the keys."

Fraswell's mouth opened and shut. "Search him!"

"We did; he's got nothing on him."

"Nothing on him, *sir*!" Fraswell barked, and whirled on Nolan. "Where have you hidden them? Speak up, man! I'm at the end of my patience!"

"Never mind the keys," Nolan said. "That's not what I came here to talk about—"

"You'll talk about it nonetheless!" Fraswell was almost screaming.

"Here, what's the trouble?" a female voice shrilled. Miltrude, looking the worse for ten days without a bath, stood in the doorway, hands on broad hips. "Well—looky



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who's here!" she said as she saw Nolan. Behind her, Leston peered over her shoulder. "Finally caught him, did you, Alvin?"

"Yes—I caught him. He's stubborn! But he'll crack! I assure you of that!"

"What about the fancy woman he was keeping?" Miltrude queried grimly. "Turn her over to me; I'll see she makes him cooperate."

"Get out!" Fraswell roared.

"Here, you Alvin!" his spouse snapped. "Mind your tone!"

Fraswell swept an empty concentrate flask from the table and hurled it viciously; it struck the wall beside Miltrude; she screeched and fled, almost knocking her son down in passing.

"Make him talk!" Fraswell yelled. "Get those keys; do whatever you have to do to him, but I want results—now!"

One of the men holding Nolan gave his arm a painful wrench.

"Not here—outside!" Fraswell sank back in his chair, panting. "Of course, you're not to do him any permanent injury," he muttered, looking into the corner of the room as they hustled Nolan away.

Two men held Nolan's arms while a third doubled his fist and drove it into his midriff. He jackknifed forward, gagging.

"Not in the stomach, you fool," someone said. "He has to be able to talk."

Someone grabbed his hair and forced his head back; an open-handed slap made his head ring.

"Listen, you rich scum," a wild-eyed, bushy-headed man with gaps between his teeth hissed in Nolan's face. "You can't hold out on us—"

Nolan's knee, coming up fast, caught the man solidly; he uttered a curdled scream and went down. Nolan lunged, freed an arm and landed a roundhouse swing on someone's neck. For a moment he was free, facing two men, who hesitated, breathing hard.

"In a matter of minutes there's going to be a stampede, right across this spot," he said blurrily. "It's a wild herd—big fellows, over a ton apiece. Warn your men."

"Get him," a man snapped, and leaped for Nolan.

They were still struggling to pin his legs when a heavy crashing sounded from behind the house. A man screamed—a shocking yell that froze Nolan's attackers in mid-stroke. He rolled free and came to his feet as a man sprinted into view from around the corner of the house, pale face rigid with terror, legs pumping. A heavy thudding sounded behind him. A big male tusker charged across the wheel-rutted turf, the remains of a wrecked rose trellis draped around his mighty shoulders. The man dived aside as the beast galloped on into the cover of what remained of the woodlot, whence sounded a diminishing crashing of timber.



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For a moment, the three men stood rigid, listening to a sound as of thunder in the mountains, then, as one, they whirled and ran. Nolan hurried around to the front of the house.

Fraswell was on the front terrace, his head cocked, a blank expression on his big features, the boy Leston beside him. The director shied when he saw Nolan, then charged down the steps, ran for the corner of the house—and skidded to a halt as a tusker thundered past.

"Good God!" Fraswell backed, spun, started for the porch. Nolan blocked his way.

"This is your work! You're trying to kill us all!" Fraswell shouted.

"Dad," Leston started as two men sprinted into view around the side of the house. One carried a rifle.

"Get him!" Fraswell yelled, pointing. "He's a fanatic! It's his doing!"

"Don't be a fool, Fraswell," Nolan snapped. "If you're in danger, so am I—"

"A fanatic! He intends to pull me down with him! Get him!" Fraswell jumped at Nolan; the other two men closed in. Wild fists pummeled Nolan; clutching hands caught his arms, dragged him down. A boot caught him in the side. He grabbed the ankle, brought the man down on top of him. The other man was dancing sideways, gun at the ready.

"Kill the bloodsucker," the one Nolan had felled shouted as he scrambled up. "Here—gimme that!" He seized the gun from the other's grip, aimed it at Nolan's head. It was tall, thin Leston who jumped forward, knocked the gun down as it fired. A gout of lawn exploded beyond Nolan.

"Pa . . . you can't—" the boy started; Fraswell whirled on him, struck him an open-handed blow that sent him sprawling.

"A traitor in my own house! You're no son of mine!"

The drumming of the approaching herd was a continuous surf-roar now. The man with the gun threw it down and ran for the dock. As more tuskers swung into view, Fraswell turned, too, and ran for it, followed by his two men.

Nolan struggled to his feet, noted the animals' course, then set off at a dead run toward a stand of native thorn on a low rise near the path of the charging herd, snatching up a broken branch from the uprooted gardenia hedge as he went. The lead animals were less than fifty feet behind him when he stopped and turned, waving the branch and shouting. The approaching tuskers shied from the hateful scent, crowding their fellows to the right of the thorn patch—onto a course that led to the dock.

Nolan dropped down on the grass, catching his breath as the



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herd thundered past. Through the dust he could see the group gathered down on the pier and on the deck of the boat.

A man on the pier—Fraswell, Nolan thought—was shouting and pointing toward the house. Someone on the boat seemed to yell a reply. It appeared there was a difference of opinion among the leadership and the rank-and-file of the UHP.

"Time for one more little nudge," Nolan muttered, getting to his feet. A few elderly cows, stragglers, were galloping past the grove. Nolan searched hastily, wrenched off a stalk of leather plant, quickly stripped it. A thick, pungent odor came from the ripe pulp. He went forward to intercept a cow, waving the aromatic plant, turned and ran as the cow swung toward him. He could hear the big animal's hooves thudding behind him. He yelled; down below, the men crowding the pier looked up to see Nolan sprinting toward them, the tusker cantering in his wake.

"Help!" he shouted. "Wait! Don't go! Help!"

The men turned and ran for the gangway. Fraswell caught at a man's arm; the man struck at him and fled. The plump figures of Miltrude and the director held their ground for a moment; then they turned and bolted onto the boat.

As they turned to look back, the sound of the ship's engines started up. The gangplank slid inboard when Nolan was fifty feet from the pier. He tossed the branch aside as the cow braked to a halt beside him, nudging him to capture the succulent prize. Nolan gave a piercing scream and fell, leaving the cow to stare after the hastily departing vessel, munching peacefully.

A tall, lean youth came around the side of the house to meet Nolan.

"Uh . . . I—" he said.

"Leston . . . how did you get left behind?" Nolan asked in dismay.

"On purpose," the boy blurted.

"I don't think your father will be back," Nolan said.

Leston nodded. "want to stay," he said. "I'd like a job, Mr. Nolan."

"Do you know anything about farming, Leston?" Nolan asked dubiously.

"No, sir." The boy swallowed. "But I'm willing to learn."

Nolan looked at him for a moment. He put out his hand and smiled.

"I can't ask any more than that," he said.

He turned and looked across the ruined lawn, past the butchered hedges and the mutilated groves toward the languishing fields.

"Come on, let's get started," he said. "The plague's over, and we've got a lot of work ahead before harvest time." ■



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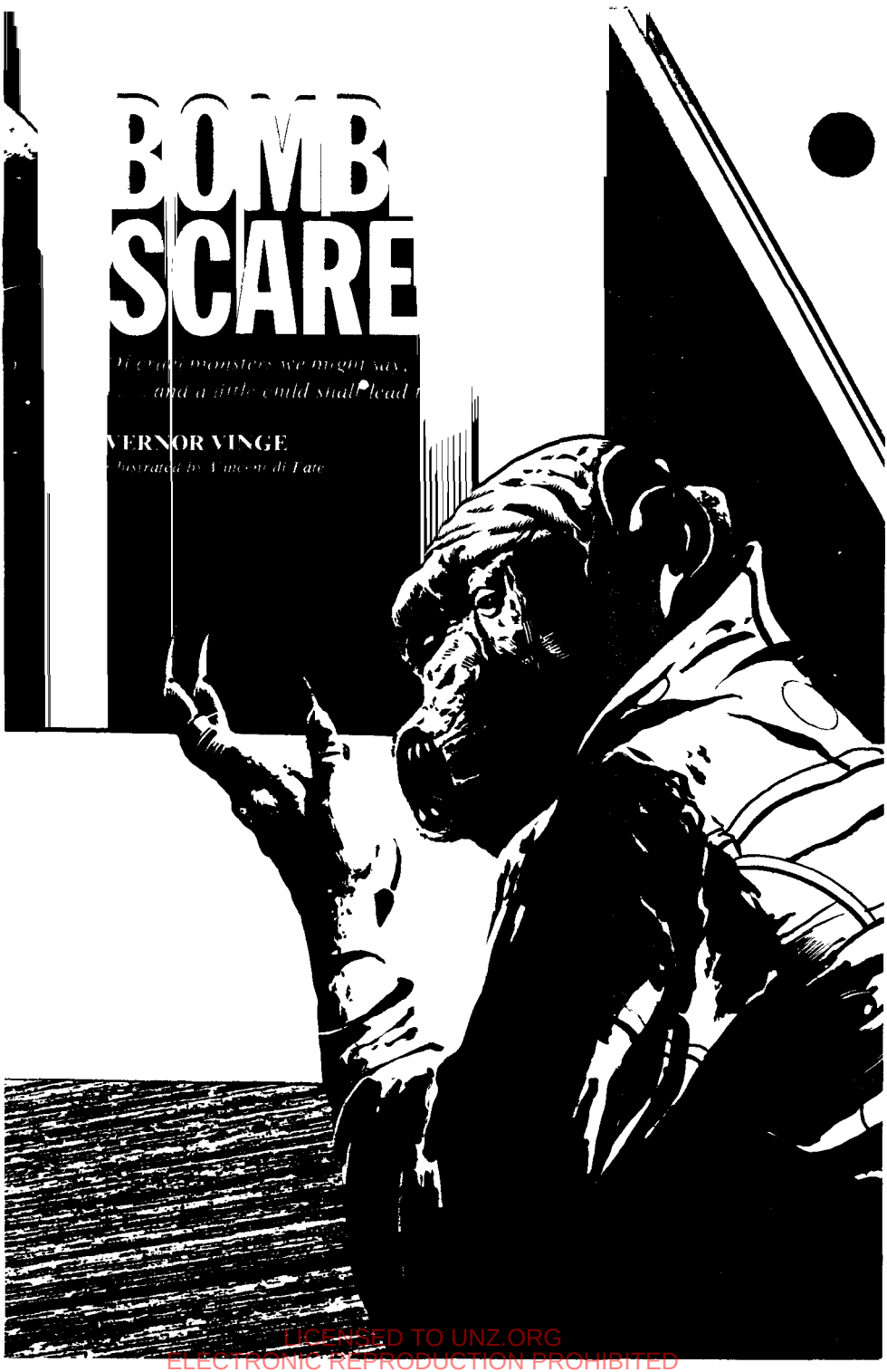
# BOMB SCARE

*It can't [illegible] we might say . . .*
*. . . and a little child shall lead t*

VERNOR VINGE

*Illustrated by Vincent di Fate*



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Prince Lal e'Dorvik dilated his mouth hole, and casually picked at pointy fangs. With great deliberation he inspected the sky: the Maelstrom glittered across fifty degrees, a spiral of silver mist. Its brilliance was dimmed by the gibbous blue planet that hung near the zenith. That blue light flooded through the transparent hull section onto the formal gardens of the Imperial Dorvik flagwagon. The soft brown sand dunes of the gardens were transformed into rolling blue carpets. An occasional ornamental lizard scurried across the sands. Within his vision, Prince Lal could see no less than five shrub-cacti: the excess vegetation made the scene almost sickeningly lush. Except for the bluish tinge of the landscape, Lal could almost imagine that he was back at Home in his winter palace.

With feigned nonchalance he turned to look at his companion, Grand General Harl e'Kraft. Prince Lal was thought harsh, in a civilization where the execution of ten thousand soldiers was considered morale-building discipline. Now he moved obliquely toward the subject at hand—with his reputation, he could afford to speak softly. "Is it always night?"

"Yes, Puissance, we keep the wagon oriented with the sun beneath the gardens' horizon. Of course, I could make a 'sunrise.' It would take less than fifteen minutes to turn the wagon . . ."

"Oh, don't bother," Lal responded smoothly. "I was just wondering what the 'super-sun' looks like." He glanced at the blue-green planet high in the sky. "Isn't it theoretically impossible for a giant star to have a planetary system?"

The young general sniffed warily at the bait. "Well, yes. Stars this size never develop solar systems by condensation. This one was probably formed by the accidental capture of three planets from some other system. Such things must be very rare, but we're bound to run across them eventually."

"Ah yes, there shouldn't be planets here, yet there are. And these planets are inhabited by an intelligent, technologically developed race. And we must have these 'improbable' planets as the industrial base for our expansion in this volume; yet we don't have them."

Lal paused, then struck with reptilian ferocity. *"Why not?"*

For a moment Harl sat frozen by the other's ophidian glare. With a visible effort he twitched his mouth hole open in a disarming smile. "Care for a milvak, Puissance?" He motioned to a shallow dish of hors d'oeuvres.

Lal had to admit that the general was a cool one. Though e'Kraft faced the Long Dying for his failure, he offered his superior candied meat rather than explanations. This was going to be interesting. He carefully speared one of the squirming milvaks with a wrist



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talon, and sank his fangs into the little mammal's hairless skin. With a sucking sound, he drained the animal of its vital fluids.

Harl e'Kraft waited politely until Lal had finished, then handed him a pack of color photographs.

"The Mush-faces are every bit as developed as you say. Their two outer worlds could supply us for any further expansion we might desire in Volume 095. They—"

Prince Lal slithered into a more comfortable position on the resting rack, and glanced at the top photograph. Mush-faces: that was an appropriate name for them. The olive-skinned monster that looked out of the photo seemed bloated, diseased.

". . . Have not invented mass-energy converters, but they do use a very efficient form of hydrogen fusion for their spacecraft. Their biggest spacewagons mass more than thirty thousand tons."

*Not bad for hydrogen fusion drive,* thought Lal. He glanced at the next picture. It was a schematic of a Mush-face battlewagon. There was the typical cigar shape of a fusion-powered craft, the magnetic venturis taking up much of the rear volume of the wagon. Ten rocket bombs were housed forward, with more snuggling under the craft's nose on outside racks.

"In one respect they are ahead of us technologically." Harl paused, then said slowly, "The Mush-faces can shield against our mass-energy converters."

This remark would have been greeted by a look of stupefied amazement if Lal's spies had not briefed him beforehand.

Lal's thirty times great-grandfather, Ghrishnak I, had conquered three oases on Home by edge of sword. His twenty-one times great-grandfather, Elbrek IV, united all Home with gunpowder and steam-powered sandwagons. His twelve times great-grandfather launched the first rockets into orbit, and perfected the hydrogen bomb for use against a group of heretics in the South Polar Sands. But the sword, gunpowder, steam, even the hydrogen bomb, all these were as nothing before the mass-energy converter. It was a simple weapon in practice: place the converter at the proper distance from the target, turn it on, and any desired fraction of the target was changed directly into energy. If such a weapon could be shielded against, the Dorvik had lost one of their trump dice.

E'Kraft continued, "This effect is probably incidental. Since the Mush-faces don't have converters, it seems unlikely that they could intentionally design a defense against them. In any case, the only way we can destroy their craft is to convert a substantial amount of mass to energy just *outside* their screens. In other words we are reduced to using rocket bombs.

"The Mush-faces have an anatomical advantage, too, Puissance. A Mush-



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face can survive more than five times the acceleration that a Dorvik can. This mobility combined with their thousand gravity rocket bombs makes their space force more than a nuisance.

"Puissance, we have done as much damage as we dare to their industrial centers. It has not broken their will. Until we gain absolute control of local space, there will be no conquest." The general's statement was blunt, almost defiant.

Lal could imagine the tiny enemy craft flashing through the Dorvik fighter screen and firing rocket bombs at the Dorvik battlewagons. From the general's own account as well as Lal's spies, it was obvious that e'Kraft had made the best of a terrible situation. Supreme tactical skill was necessary to survive an enemy with longer legs and better defenses than one's own. He riffled through the rest of the photographs. They showed proposed modifications in the Dorvik reconnaissance skimmers, for use as self-propelled bombs. Lal's race hadn't used rocket bombs in three centuries, so now that they needed them, such weapons were unavailable.

When Lal finally spoke, his face and tone contained nothing complimentary. "So these pus-filled creatures are too stubborn for you? Your view is just too narrow, General." He pulled an ornamented slate from his waist pouch. "That sickeningly blue planet," Lal waved at the brilliant object directly overhead, "has twenty percent of the population and only three percent of the industry in this solar system. Its destruction would hardly impair the system's usefulness to us. This"—he gestured with the triangular slate—"is an order, signed by my father. It directs you to detonate this planet."

E'Kraft's tympanic membranes paled.

Prince Lal hissed gently. "You find this overly violent?"

"Y-yes." The general was still blunt.

"Perhaps, but that is the point. You will convert one trillionth of one percent of the planet's mass. The explosion will be so vast that it will gently scorch portions of the other two planets. The deed's very essence is violence and brutality; it will show this race that further resistance would be worse than any surrender." Lal recited several stanzas from the liturgy of Dominance, finishing with:

"Ours is all that is and we rule all those who be,
For we are the Dorvik, the sons of the Sands.
And to those who deny our rule we say:
Bow down—or *be not.*

"It is immaterial whether you believe this doggerel garbage. The point is, that by divine authority or not, our race must stay on top. The day we take second place in the universe will be the begin-



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ning of the end for the Dorvik. If through some weakness of spirit we fail to conquer this system, then we will be consigning ourselves to the museums of the future just as surely as if we were destroyed in battle."

In a single fluid motion, Lal reached out from his resting rack and handed his subordinate the order. "Implement this at once. And be sure you don't annihilate more than the mass fraction specified, else this whole solar system might be destroyed."

"I'm quite acquain . . ." e'Kraft was prevented from digging himself a grave by the appearance of one of his aides. The man's three-dimensional image flickered, then steadied.

"Puissance, General." The aide bowed to Lal and then to e'Kraft. "Thirteen seconds ago we detected a gravitic disturbance near the sun. Someone has entered the system."

"So!" Lal fumed. When he got his talons into the insubordinate wretch that dared enter the combat zone without prior announcement—

The aide continued excitedly, "Puissance, it doesn't respond to our IFF. It's not one of ours."

Prince Lal turned sharply to Harl. "Could the Mush-faces be experimenting with interstellar drive?"

"Unlikely, Puissance. The largest mass they've ever assembled in free fall was less than one hundred thousand tons. The smallest drive unit we have masses more than a billion."

That was the Dorvik's other trump. Without mass-energy converters, it was essentially impossible to hoist a drive unit into orbit, where it could operate.

The aide turned to look at someone outside of pickup range, and his excitement changed to pale and groveling terror. "The intruder is exactly one kill-radius from . . . from the sun!"

To convert a star—Lal gasped. While he had been ordering the destruction of a single inhabited planet, someone—some*thing*—absolutely evil had fused a bomb to murder a galaxy.

It *was*, where an instant before nothing had been.

At one kill-radius from the primary, harsh white sunlight reflected blindingly off the little ovoid, all but blotting out the intricate gamma colored designs that covered its surface.

Two creatures sat within the apparition. Considering the variety possible in this universe, they looked much like the Dorvik. A closer examination by someone trained and clever might have revealed a trimness and efficiency in the intruders' structure that was missing from the Dorvik—that is missing from any natural race. For the intruders' race had supervised



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its own evolution for more than 100,000 years. The result might not be remarkable in appearance, but the brains housed in those bodies were far quicker, far more subtle than anything unaided natural selection could produce. And though their grosser emotions were perhaps intelligible, any conversation presented here verges on falsehood in its incompleteness.

One of the creatures—identifiable by the two bristly spikes that grew tangentially from its head—turned to the other and said, in effect, "I still want S Doradus."

"Gyrd, this star is almost as big. And quite a bit easier to reach, too." The creature paused, adjusted the controls somehow. "Figuring the jump back is going to take all my concentration, so you'll have to cancel the relative velocity on the converter when we drop it."

The first replied. "No one tells me what to do, Arn."

An air of hostility just short of physical violence filled the tiny cabin. Then Gyrd submitted with a nod.

"That's better." Arn relaxed. "Just imagine all the maggots that will fry in the fire we're going to set."

Lal broke the awful silence. "How far away is this object?"

"Twelve billion kilometers, Puissance. We won't be able to detect it by electromagnetic means for another ten hours."

"How long would it take to compute a jump to its location?"

The aide did some fast figuring. "If we use everything, including our tactical computers, about ten minutes."

"Very well, put everything you have on the problem. We'll jump one of our battlewagons."

"Yes, Puissance—"

"But, Puissance, what about the Mush-faces? If we don't use the tactical computers for minimal defense, they'll tear our fleet apart."

Lal scarcely hesitated. "We'll have to take those losses. If we can't stop that . . . thing . . . near the sun, we'll all be dead anyway, and the Dorvik empire will be destroyed in less than ten centuries." He noticed that the aide was still waiting nervously. Lal turned to the man's image and shrilled, *"Move!"* The aide bowed spastically and the image vanished.

The prince struggled to bring his voice back into control. "General, evacuate one of your battlewagons. We'll annihilate its entire mass right next to the Enemy." His emphasis capitalized the word; the Mush-faces were merely an enemy.

"Yes, Puissance."

"Ten minutes."

Harl nodded, began giving orders on his private comm. In the presence of a member of the Imperial Family he was reduced to the status of messenger boy.

Lal had given his orders, and now had to endure a small eternity



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as they were executed. Somewhere he knew mountainous computers were ticking away at the calculations involved in even the shortest jump. Somewhere else, ten thousand men were trying to abandon their battlewagon before the deadline he had set. And somewhere, twelve billion kilometers away, was an object that had to be destroyed else the galaxy would die.

A brilliant red star appeared just above the gardens' pseudo-horizon. The dot expanded, becoming fainter as it grew, the mad red eye of a monster. Almost simultaneously, three closely spaced red "stars" shone just two degrees away from the first. Lal recognized the characteristic glow of fusion bombs. The Mush-faces must have discovered that the Dorvik defense patterns were no longer adaptive. Without tactical computers, the Dorvik were squatting milvaks before the attack. Those bombs couldn't have been closer than 100,000 kilometers, but the enemy was moving in.

"Enemy rocket bomb at fifty thousand kilometers and closing," said a disembodied voice.

Lal strained for some glimpse of the enemy. He noticed the silvery crescent of another Dorvik battlewagon some two hundred kilometers away, but that was all.

Both men sat in the flagwagon's imperial gardens and counted their last seconds.

A white glare lit the gardens. Lal looked up, startled. The battlewagon he had noticed before had fired its rockets and now moved slowly across the sky. The brilliance of its jets brought temporary daylight to the gardens.

"It won't work," Harl whispered.

But somehow it did. The feeble-minded rocket bomb accepted the other battlewagon as its target of opportunity, and the gardens' curving crystal walls turned opaque as the wagon's screens powered up. When the walls cleared, the other wagon was gone: ten thousand men and the gross annual product of an entire continent had been vaporized in less than a millisecond.

General e'Kraft's fangs clattered together with suppressed emotion. To lose men in war was expected, but to sit defenselessly and let an enemy destroy you with inferior weapons was nightmare. Abruptly he looked up, as if listening to some private voice. "Puissance, the crew of the *Vengeance* have removed to the *Sword of Alkra.*"

Several more red dots appeared near the zenith, but Lal ignored them. The fleet would have to hold together just a little longer . . .

The aide reappeared. "Computations complete, Puissance. Just tell us which bat—"

"The *Vengeance.* As soon as the jump is made and you are sure the Enemy is nearby, annihilate the entire mass of the wagon."

Lal's urgency was conveyed to the other man, who vanished without even bowing.



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Harl said something on his private circuit, and a flat image appeared before them. "That's from a camera aboard the *Vengeance*. It's transmitting by gravitic means, so we'll be able to see everything up to the detonation."

The picture showed the Maelstrom with the Mush-faces' planet off to one side. Abruptly the blue planet vanished. Startled, Lal glanced up and saw that the planet was still in his sky. He realized ashamedly that the *Vengeance* had made its jump. Since the wagon's orientation in space was still the same, the stars had not moved.

Then the camera turned and the constellations slid across the screen. The camera hunted—and found. At the center of the screen Lal saw a tiny white dot that drifted slowly across the field of stars. That was the Enemy. It couldn't be closer than ten thousand kilometers. The detonation of the *Vengeance* would be quite effective at that range, but the jump should have been more accurate.

Apparently the same thought had occurred to e'Kraft, who said, "Navigation, how far is the *Vengeance* from target?"

"Ten kilometers. The enemy craft is less than nine meters long."

*Less than nine meters long.* The smallest interstellar craft the Dorvik ever made was more than a kilometer wide. The Enemy was superior to anything Lal had imagined. If only there were some way to capture the Enemy craft, to learn its secrets. Possibly even more important, to learn what manner of monster would annihilate a sun.

"Detonate the *Vengeance*."

And the screen turned gray.

E'Kraft spoke. "The entire mass of the wagon has been converted to energy, Puissance."

Lal stared stupidly: it was so anticlimactic. They had just created more energy in a second than the average G-class star produces in an hour, yet this explosion was observable only as a blank image screen, or the motion of a tiny hand on the dial of a gravitic surge detector. It would take ten hours for the light from that explosion to reach them. Even then it would set houses afire on the blue planet.

How close it had been . . . another few seconds and the Enemy might have completed its obscene mission, and so doomed the Dorvik race. For the moment at least, all was saved. He turned to e'Kraft and saw relief mirrored in his eyes.

"General, I—"

He was interrupted by the reappearance of the general's aide. "Puissance, we detected a grave disturbance after the detonation."

*"After?"*

"Yes, Puissance. Somehow the intruder survived the detonation."

"That's impossible!" shrieked Lal, even as he accepted the awful truth. Nothing made by men could withstand the vast fireball that the



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*Vengeance* had become. *What were they fighting?*

The game might already be over. Lal's eyes looked across the imperial gardens, but his mind saw a wave of hell creeping out ever so slowly from an annihilated star. The energy from such a detonation would vaporize planets a hundred parsecs away; and the destruction would creep on, confined to the speed of light but pushing inexorably across the galaxy. His race would know of the explosion, and would retreat before the swelling sphere of oblivion, but little by little the galaxy would be taken away from them, until every planet was lifeless and his race . . .

"See! The maggots have guessed what we're going to do. That was a nasty jolt they just gave us, don't you think, Gyrd?

"The maggots are trying to avoid the big fry, but they can't save themselves." He paused, overcome by anticipations of delight. "We'll watch the fire spread from nest to nest—for ten thousand years we'll watch them burn."

The other creature agreed enthusiastically, its earlier anger almost forgotten. Neither of them noticed a slight wavering in the air behind them. The distortion was in the far infrared and near microwave. The changing refractive indices moved through the visible, the ultraviolet, the gamma. Still Gyrd and Arn were too engrossed to notice.

"The converter is set to go when we jump, Arn. What's keeping you?"

"The navigation, of course. This is a galactic jump we're making. Give me a few more seconds."

"Idiot."

The shimmer took form. Gyrd turned from Arn and saw what had materialized behind them.

"Mother!"

But for her physical perfection she looked much like her remote ancestors, who tamed fire in Africa and—scant millennia later—played with fission under a stadium in Chicago. There was fear on her face, the fear of a parent who has discovered anew that untrained children are essentially monsters—and that if those children are godlings, then their evil can be satanic. She stared at her daughter, Gyrd, for a long moment, then said slowly, "Why are you here?"

**THE ANALYTICAL LABORATORY / JUNE 1970**

| PLACE | TITLE | AUTHOR | POINTS |
|---|---|---|---|
| 1. | Star Light (Pt. 1) | *Hal Clement* | 1.75 |
| 2. | Compulsion | *James H. Schmitz* | 2.46 |
| 3. | Message to an Alien | *Keith Laumer* | 2.73 |
| 4. | A Tale of the Ending | *Hank Dempsey* | 3.72 |
| 5. | A Matter of Orientation | *Bob Buckley* | 4.17 |



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Arn said, "Because we're lost?"

The woman shook her head. "I defused the converter, Arn, right where Gyrd dropped it. You can make no successful lie, or excuse, for what you've done. A million different races, all with the potential to become what we are, would have been destroyed by what you planned."

Gyrd pulled nervously at one of her pigtails. "But they're just festering in their nests. They don't feel pain the way we can. It would be fun—"

"Fun?" the woman said, and Gyrd screamed.

"Go home now." She frowned in momentary concentration. "The arithmetic has been done. The machine is ready to jump. I'll be following right behind you."

Both Arn and Gyrd were silent now, dazed. Arn made an adjustment in the controls, and their craft vanished, leaving the woman standing pensively in space.

Lal only caught the last part of the sentence.

". . . Gone from the galaxy."

"Damn it! Why didn't you say that in the first place?" snapped Harl.

"Never mind, General," said Lal. He turned back to the aide. "Say that again."

"Puissance, our instruments indicate that the intruder jumped before making any attempt to annihilate the sun."

*The universe regained.*

The silence was finally broken by General e'Kraft. "Have we your permission to resume tactical operations, Puissance?"

Lal looked through him and beyond. For a moment he could feel only the beauty of the luscious gardens and the now safe stars. *But it could happen again.* The Enemy could sweep in on any large star in the galaxy and set their bomb. "General, you may retreat, and you may ask the Mush-faces for peace terms." He gnashed his fangs once as he discarded his race's dream and accepted a nightmare. "We can spread the news of this day through the galaxy much faster than we can our empire. And we'll need all the help we can get." But Lal knew with silent desperation that there would never be enough advanced races to guard all the super stars.

"Everything that lives must be banded against them." He shook a talon at the sky.

The woman remained a moment, alone. Her feet seemed planted in the wispy Maelstrom—called the Milky Way by some—and faint air vapors encircled her. She gazed out from the sun and "saw" the Dorvik battlewagons twelve billion kilometers away. Perhaps some good could come of this yet. She hoped so. She wanted very much to believe that they were really good children . . . *all* of them. ■



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*To define "life as we know it," you have to know what "life as we know it" is. And it's probable that you have no idea just how exceedingly tough life here on Earth is!*

by Rick Cook

# LIFE AS WE DON'T KNOW IT

Since Mariner and Voyager it has become an article of faith with Sunday-supplement science popularizers that "life as we know it" is impossible anywhere in our solar system except Earth. It's obviously too hot, or too cold, or the pressure is too wrong, or the atmosphere is too poisonous for "life as we know it" to survive.

Obviously.

It may be obvious, but it's wrong.

*Figure 1: "Developments in Industrial Microbiology" Volume 6. All other photographs in this article are taken from "Petroleum Microbiology", by Dr. J. B. Davis. (Published 1967 by Elsevier Publishing Co., Amsterdam.)*

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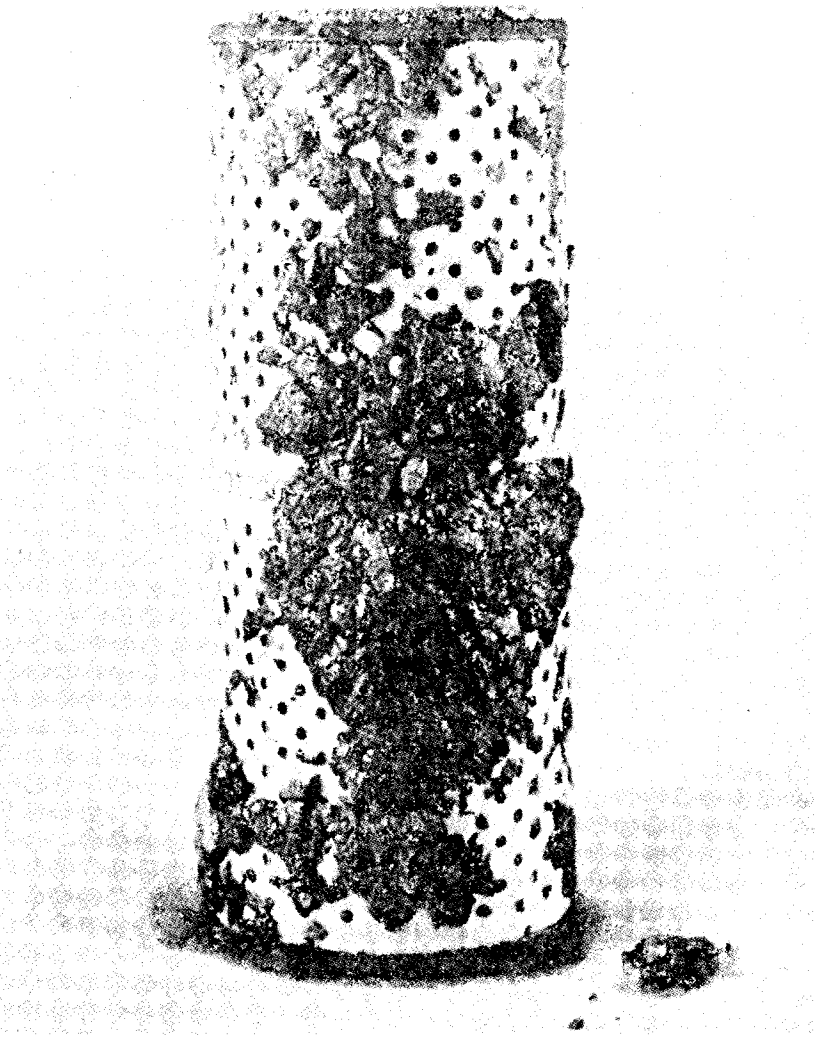

*A micronic fuel filter from an Air Force refueling system after bacterially contaminated fuel was pumped through it. Build-ups like this can clog fuel systems and starve aircraft engines. (Developments in Industrial Microbiology, Volume 6—London, Finerock and Killian)*



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The joker in that line of reasoning lies in the phrase "life as we know it." The assumption, that just because something as highly evolved and complex as a mammal couldn't survive under those conditions "life as we know it" is impossible, is one of the most appalling pieces of ethnocentricity since Aristotle insisted the Earth was the center of the universe.

The problem is really more psychological than scientific. When people use the phrase "life as we know it" what we usually mean is "life as I am familar with it." Compared to the varieties of living things we know to exist this is a very narrow and limited concept.

Now I don't know whether life as we know it *does* exist on other planets, but based on the tremendous variety of conditions that life has adapted to on Earth, I know that it can. What's more, I'm willing to bet that the vast majority of the people, who glibly dismiss life on other planets, just aren't aware of some of the extremes life exists under on their own planet.

Just for fun, let's take a look at some of the more extreme environments "life as we know it" exists under here on Earth. Table 1 lists the extremes for a few physical parameters.

There are a few comments in order about that table. In the first place, the extremes listed are the ones under which the organisms referred to will grow and reproduce. If you want to talk about bacterial spores and such, all bets are off. The bacteria that were growing at −24° C were doing it in a salt-saturated pool in Antarctica. Although there wasn't much available in the way of nutrients, the col-

TABLE 1: ENVIRONMENTAL EXTREMES

| FACTOR | LOWER LIMIT | UPPER LIMIT |
|---|---|---|
| Temperature | − 24° C (bacteria) | 104° C at 1,000 atmospheres (sulfate reducing bacteria) |
| | | 80° C at 1 atmosphere (algae) |
| pH | 0 (Thiobacilli) | 13 (Plectonma nostocorum) |
| Pressure | .1 atmosphere (bacteria) | 1,400 atmospheres (deep-sea bacteria) |
| Salinity | double-distilled water (Hetrotrophic bacteria) | saturated brines (Dunaliella, halophilic bacteria) |



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onies were big enough to be seen with the naked eye.

If you remember your biology, you should recognize almost all the winners in our tough environment contest as bacteria. There are some excellent reasons for this. In the first place, bacteria are about as simple as you can get and still have a life form capable of an independent existence. What's more they're *rugged*. Bacteria have been found growing in the shielding water in swimming pool reactors; they have been pressurized to 1,000 atmospheres and depressurized to 1 atmosphere 10 times in 10 minutes. A standard method of shipping colonies of bacteria is to freeze-dry them. (The result is called "Instant Bacteria"—just add water and stir.)

The bacteria's trump card in the survival sweepstakes, though, is their adaptability. Bacteria crowd a lot of organisms into a very small space and reproduce on the average of once every half hour. The high number of organisms and ultra-rapid reproduction rate lets them mutate quickly to meet a changing environment. And since they're asexual, a bacterial Adam doesn't have to go looking for an Eve to help him repopulate the world. If some members of a bacterial colony can survive for twenty-four hours under changed conditions, chances are excellent that the colony will go on growing and reproducing indefinitely.

About the only thing bacteria have to have to survive is a "circulating aqueous environment"—more-or-less running more-or-less water, in other words. Water serves to carry off the bacteria's waste products and is used to build protoplasm. The only places on Earth that are naturally bacteria-free are: A) bone-dry; or B) completely stagnant. Where bacteria are concerned the terms "bone-dry" and "stagnant" are very, very relative. Some bugs do nicely in the 70 parts per million of water dissolved in jet fuel at 70°F.

Another important aid to bacterial ubiquity is their ability to eat almost anything. Table 2 lists some of the substances bacteria consume to produce energy.

As usual, a capital-letter name designates a whole genus of bacteria while a small-letter name refers to a single species.

This list deals only with energy sources—i.e. substances that are oxidized or reduced to produce energy to run the cell. The number and variety of substances that can be broken down by bacteria, or substrates, is almost infinite. Under the proper conditions, any organic substance, no matter how complicated or what hellish combinations of ingredients it may contain, will ultimately be broken down by bacterial action. (Even such things as detergents and insecticides can be broken down by



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TABLE 2

| SUBSTANCE: | METABOLIZED BY: |
|---|---|
| hydrogen | Hydrogenomonas |
| sulfur | Thiobacilli |
| sulfuric acid | Desulfovibrio |
| hydrogen sulfide | Thiobacilli, green and purple sulfur bacteria |
| iron | Thiobacillus thiooxidans, Ferrobacillus ferrooxidans |
| selenium | M. selenicus |
| carbon dioxide | Methanobacteria |
| ammonium hydroxide | Nitrosomonas |

bacteria. The reason these things present such a contamination problem is that it takes the bacteria a while to do it.)

This omnivorousness is a big biological advantage for bacteria; it allows them to make use of substances that would poison any other organism. Indirectly this benefits the higher organisms since the bacteria function as the ultimate scavengers on this 25,000-mile-in-diameter spaceship the passengers call Earth. Bacterial action prevents all the rest of the inhabitants of this planet from dying of waste-product poisoning.

The ability of bacteria to break down complex substances is definitely useful—unless you've got some complex substances you don't want broken down. Take jet fuel as a not-quite-random example.

To most people a tank of petroleum hardly qualifies as an ideal condition for "life as we know it," but to date we've isolated some 16,000 organisms that live and reproduce in everything from gasoline to asphalt. Not only will these little beasties live in the stuff, give them a little moisture and you'll have a regular microbiological zoo on your hands in very short order.

We came by that last piece of information the hard way. Not too long after jet aircraft came into widespread use, Air Force pilots began reporting sudden, drastic losses of power—usually at an inconvenient moment like takeoff.

Examination showed the fuel systems of the affected aircraft to be clogged with a sludge composed of bacteria, fungi, bacterial waste products and emulsions of fuel and water. (Yes, fungi will grow very nicely in jet fuel. There is one case on record where a researcher added some nutrient to a sample of fuel oil and wound up with a nice crop of mushrooms.)



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Research revealed that the bugs were growing and reproducing in the fuel systems of many major air bases aided by condensed moisture in the bottom of the storage tanks and less-than-scrupulous housekeeping procedures. It turned out that the water was the real catalyst for the bacterial population explosion—a fact that wasn't too helpful in suppressing the bugs since it is almost impossible to keep water out of a fuel system.

A variety of methods were tested to keep down the bacterial population in the fuel systems, including *ultra-sonic and radio-frequency* "death rays," ultra-fine filters and chemical inhibitors, but in the end the job was given to Ethyl Gylcol Monomethyl Ether (EGME). EGME was originally added to fuel to prevent the formation of ice. It turned out that not only did it inhibit ice, it inhibited bacteria to boot. It also had the happy property of concentrating in the condensed moisture under the fuel. Recent tests show that the water in some Air Force fuel systems contains as much as 47 percent EGME.

Controlling bacteria by poisoning them has one drawback, however—the bacteria have a nasty habit of not staying poisoned. In the laboratory it has been possible to adapt successive generations of bacteria to higher and higher concentrations of normally poisonous substances until strains are evolved which manage nicely under conditions that would have wiped out their ancestors. This process is undoubtedly going on in jet fuel systems all over the world right now.

If just one bacterial cell turns up with the ability to reproduce in the presence of high concentrations of EGME, we'll be right back where we started from.

Any bacteriologist can cite examples of this sort of bacterial perversity, perhaps the most famous of which is the case of Staphylococcus aureus.

Staphylococcus aureus—or "Golden Staph" from the appearance of the cultured colonies—is the cause of a whole series of particularly nasty and frequent fatal infections. It has a fairly high tolerance for temperature variations and the ability to survive outside the human body for long periods of time. These characteristics make it hard to control, particularly in places like hospitals where there are a lot of open wounds and people suffering from staph infections are taken for treatment. One of the great booms of antibiotics was that they could easily handle staph infections.

The development of antibiotics had two effects that hadn't been anticipated. Since antibiotics could easily control secondary infections, hospitals, which were plagued with a chronic shortage of help, relaxed their standards of cleanliness. At



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the same time some doctors took to dosing patients, with relatively minor infecions, wholesale with the new drugs. Many conscientious physicians deplored the practice, but all agreed it was a lot easier than listening to a patient complain about a sore throat.

Under these circumstances resistance to antibiotics became a definite and very important pro-survival characteristic. It wasn't long before new strains of staph had evolved which were capable of taking huge jolts of the new wonder drugs and coming up fighting. When these strains found their way into hospitals the rate of secondary infections skyrocketed, aided by the less-stringent hospital procedures.

The net result has been that hospitals have had to find other ways to compensate for their lack of help, chemists have had to develop new antibiotics, and doctors have become a lot more cautious about handing them out for fear bacteria might develop strains immune to them.

(In the course of their researches, bacteriologists developed a strain of staph that was immune to everything they could think of, but barring an all-out war, that one will probably remain a laboratory curiosity.)

So far the bug that will metabolize EGME in fuel systems hasn't shown up, but it's interesting to note that as recently as 1966, about eight years after the Air Force started using EGME, microbiologists were still testing fuel samples to find out if they were being biodegraded.

The affinity of bugs for aircraft fuel is particularly unpleasant in view of a very unfortunate bacterial side effect: Quite unintentionally, some bacteria corrode the devil out of metal. Naturally an aircraft's fuel tanks are lined with plastic, or rubber, to protect the metal, but bacteria can go through a layer of our standard protective material—polyurethane—in about eight days.

It could be worse. We used to line our tanks with Buna N, a synthetic rubber, until tests showed that bugs went through that in about four days and added insult to injury by using it as a nitrogen source to build protoplasm.

Bacterial corrosion in aircraft fuel tanks is strictly a side effect of bacterial growth. These particular bugs don't metabolize the metal or produce acids that attack it—they change the electrode potential of the metal they're growing on. Bacterial colonies can create as much as a 60mV difference between the colony—which acts as an anode—and the surrounding metal. The result is a sort of a deplating process that eats right through the metal. (There are bugs that metabolize metal and others that produce strong acids, but we'll get to them in a minute; one headache at a time.)



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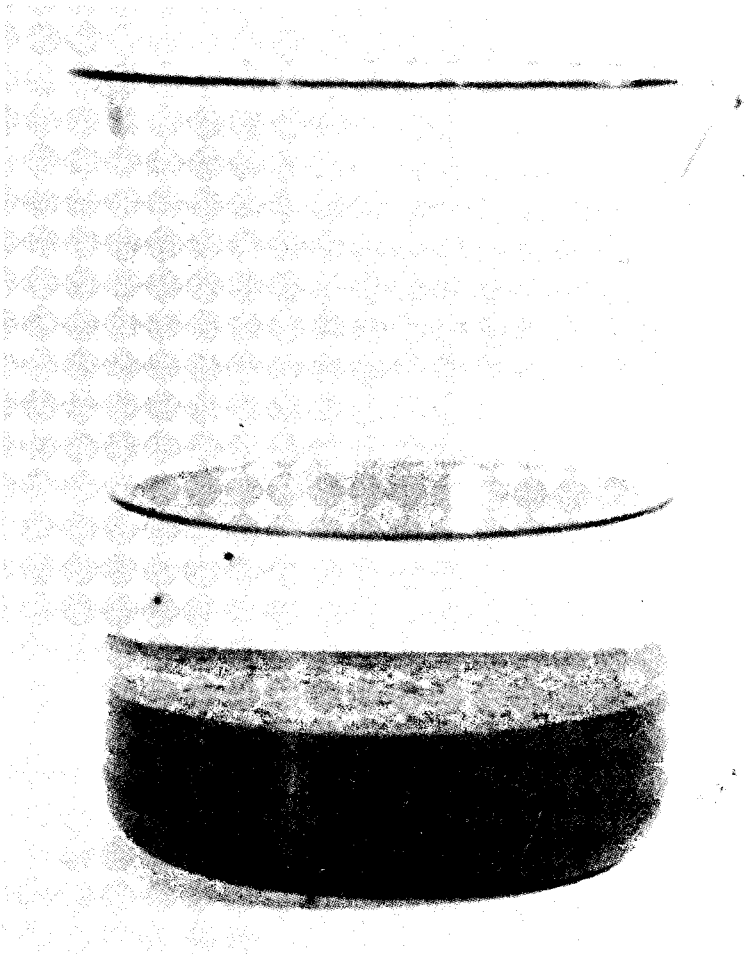

*A sample of gasoline and bacterially contaminated bottom water from a storage tank. Although some of the bacteria can grow and reproduce in gasoline, they grow a lot better if there's some water present.*

Bacterial electrolytic corrosion was first discovered in 1895 by a Dutch scientist who was curious about some of the strange things that were happening to cast-iron water mains in the Netherlands. Even though they had been coated with asphalt for protection, the



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mains were failing in as little as two years. The pipes would look normal when dug up, but they would be soft enough to cut with a knife. The scientists found that bacterially-induced electrolytic corrosion was removing all the iron from the mains and leaving behind the carbon in the cast iron as a sponge-like matrix. The result was something that looked like cast iron and had about as much mechanical strength as a good grade of taffy. Naturally the bugs were eating the "protective" asphalt coating as they grew.

Nearly all metals are susceptible to this sort of bacterial fun and games. Even the tough surface layer that makes stainless steel stainless is corroded off by the bugs, followed by the metal under it.

Bacterial corrosion is particularly severe in oil fields. The combination of miles of buried pipe and plenty of hydrocarbons for food provide almost ideal conditions for all sorts of bacterial dirty work. Under favorable conditions bacteria will eat through a quarter-inch buried steel plate in less than a decade. In one field near Ventura, California, bacterially induced corrosion caused 40 oil well casings to fail in a seven-year period.

In the wells themselves there's a fairly simple solution: The bacteria responsible do best at pH 8.5 or under, so drillers keep their drilling fluid at pH 10 or above. This, and the judicious use of inhibitors keeps, the bugs in their place.

With a pipeline it's not so easy, since most of the corrosion occurs from the outside in. The bacteria have an uncanny knack for penetrating protective coatings including inert plastics like polyvinyl chloride. So far the best solution seems to be to coat the pipe with a coal-tar compound that gives the bugs a hard time and starve them by keeping organic matter out of the trench the pipe is buried in.

## MOVING OUT: AUTOTROPHS, OIL PRODUCERS AND ENERGY

All the above will give some idea of the variety, toughness and adaptability of bacteria, but it doesn't really tell much about the limits of life as we know it. Where bacteria are concerned, organisms that eat jet fuel and corrode metal are pretty prosaic. If we really want to push out to the fringes, we've got to look at some of the more unusual autotrophs.

Autotrophism is an erudite way of saying that an organism can satisfy all its nutritional requirements with inorganic substances. Autotrophic organisms are the basis of all life on Earth. For every organism that gets its energy from inorganic substances, somewhere—or in the case of petroleum, sometime—there must be an autotroph to produce the organic substances in the first place.



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The most familiar form of autotrophism on Earth is the photosynthesis of green plants. The plants take carbon dioxide, water and sunlight and with the aid of some very fancy chemical hocus-pocus produce sugar and oxygen. The generalized reaction for the process is:

$$X\,CO_2 + Z\,H_2O \xrightarrow{\text{light}} C_xH_yO_z + O_2$$

This is what most people mean when they say photosynthesis. Certainly it is *a* photosynthetic reaction, but it's not *the* photosynthetic reaction. Existing along the fringes of life as we know it is another set of photosynthetic reactions, ones that offer some extremely interesting possibilities for life on other planets. The generalized formulas for these reactions are:

$$X\,CO_2 + \frac{x}{2}\,H_2S + Z\,H_2O \xrightarrow{\text{light}} C_xH_yO_z + \frac{x}{2} + H_2SO_4$$

(purple sulfur bacteria)
and:

$$X\,H_2S + Y\,CO_2 \xrightarrow{\text{light}} C_yH_xO_y + Y\,H_2O + X\,S$$

(green sulfur bacteria)

These are the generalized reactions for bacterial or sulfur-cycle photosynthesis. While these reactions aren't as widespread as oxygen-cycle photosynthesis, they exist in places where oxygen-cycle photosynthesis won't, and produce some extremely important results. As you'll note the three equations are very similar. The major difference is that in sulfur-cycle photosynthesis an inorganic oxidation replaces the release of free oxygen by the green plants.*

Sulfur cycle organisms differ from their counterparts only in the reaction they use to get energy. Their protoplasm is based on carbon, the same as oxygen-cycle protoplasm; there are no silicon creatures, or fluorine breathers, among them. Nearly all of their strange characteristics are due to their adaptation to the sulfur cycle.

Every reaction on the oxygen cycle has a counterpart on the sulfur cycle. (Which is what makes them a good starting point; most exotic-metabolism bacteria only represent part of a cycle.) In photosynthesis, for instance, the role played by green plants is handled by two types of bacteria—the green sulfur bacteria (which produce elemental sulfur) and the purple sulfur bacteria (which produce sulfuric acid.) Actually the names are a little misleading.

*FOOTNOTE: Since from here on out we're going to be dealing almost exclusively with the energy metabolism of various bacteria, terms like "oxygen cycle" and "sulfur cycle" are used to designate the various systems of oxidations and reductions that bacteria use to get energy. This may be confusing since ecologists use the same terms to refer to the paths an element follows as it is cycled through the biosphere. To an ecologist, the bacteria that fix gaseous nitrogen are definitely part of the nitrogen cycle. But since they get their energy by breaking down sugars in a thoroughly conventional manner, for our purposes they're part of the oxygen cycle.

Also remember that the various energy equations are horribly simplified. They show what ultimately happens and totally ignore how it is done. To accept these equations as the whole truth would be like saying all you have to do to get atomic energy is rub two pieces of plutonium together.



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In the first place the "purple" sulfur bacteria usually aren't purple; colonies range in color from blood-red to muddy brown. In the second place the chlorophylls in both kinds of bacteria are green, the same as all chlorophylls. The colors of the purple sulfur bacteria come from a class of biological pigments known as caroteniods, substances that prevent the bug from coming down with the bacterial equivalent of a sunburn.

Photosynthetic sulfur bacteria live in water generally towards the bottom where decaying organic matter provides them with ample hydrogen sulfide. Since there is frequently a layer of algae growing over them, the sulfur bacteria have chlorophylls that absorb most of their energy from the far-red and infrared parts of the spectrum.

Like plants, photosynthetic bacteria are phototropic—they need light to function. But just as the oxygen produced by the plants is reduced back to carbon dioxide by animals, the sulfur, or sulfuric acid, produced by photosynthetic sulfur bacteria is reduced to hydrogen sulfide by other types of sulfur bacteria.

In water the reaction with the disassociated sulfate ion is:

$$2\,SO_4^{=} + 2\,H_2O \longrightarrow H_2S + 5\,O_2$$

Useful, but smelly.

Because sulfuric acid is biodegradable to oxygen and a bad smell, the biochemically produced kind normally doesn't pose any problems.

But there are cases . . .

Take a sewer for instance. Almost by definition, a sewer is full of a wide variety of organic compounds, most of which are starting to decompose. Since a major component of decomposing organic matter is sulfur and since sulfate is the second most common anion in rainwater, there is plenty of raw material for sulfur bacteria—such as Desulfovbrio—to convert to hydrogen sulfide.

As the hydrogen sulfide rises it encounters a layer of condensed moisture clinging to the walls of the sewer pipe. Here the hydrogen sulfide is acted on by another type of bacteria—the Thiobacilli—and the fun really begins.

Thiobacilli are colorless sulfur bacteria, so called because, although they lack chlorophyll, they can convert hydrogen sulfide to sulfuric acid. The reaction they use is:

$$H_2S + 2\,O_2 \longrightarrow H_2SO_4$$

You'll note that unlike their photosynthetic cousins, colorless sulfur bacteria need free oxygen to oxidize the sulfide.

Now the amount of biologically produced sulfuric acid in decomposing sewage is seldom very high, almost never high enough to affect cast iron. But the Thiobacilli act as concentrators for the sulfur in the system, storing it in the con-



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densation layer as sulfuric acid. Pretty soon there's not much sulfur left in the sewage, but there's plenty of sulfuric acid clinging to the walls of the sewer pipe. Some of the Thiobacilli do best between pH 3 and pH 1 and will grow all the way down to pH 0—that's two-and-a-half normal sulfuric acid!—so the process isn't easily stopped by end-product poisoning. If the sewage stays in the pipe long enough, you're not going to have much pipe left.

Because of this little bit of biochemistry, vitrified clay pipe is mandatory in warmer climates where this process is particularly vicious.

Sulfur bacteria do more than just wreck sewers though; they play a vital role in the formation of the most necessary raw materials of our civilization: Oil and sulfur.

Take a large stagnant body of water, say a lake. As organic matter accumulates on the bottom, sulfur bacteria go to work on it to produce hydrogen sulfide. Some of the sulfur bubbles toward the surface to be used by photosynthetic sulfur bacteria, some of it combines with iron in the soil to form iron sulfide and a lot of it dissolves in the water. This dissolved hydrogen sulfide does two things: it ties all the oxygen in the water up as various acids of sulfur and it creates a highly reducing solution. Because conditions on the lake bottom are anaerobic and reducing, microorganisms living on the decaying matter lack the hydrogen acceptors they need to break down the organic matter completely. Given a few million years, a lot of pressure and a number of other conditions just right and this partially degraded organic matter ends up as crude oil.

In the meantime, the hydrogen sulfide is obligingly separated from the forming oil by Thiobacilli. Since they lack the free oxygen they need to convert the sulfide to sulfuric acid, they settle for oxidizing it to free sulfur. Most of the sulfur settles out in large deposits associated with oil-bearing rock. (A good thing, too—when you burn high-sulfur fuels in an internal combustion engine you get sulfurous acid as a by-product.) The sulfur deposits are mined by man to get the sulfur he needs to run his industries. The paper this is printed on, for instance, was made with bacterially deposited sulfur.

It may be an exaggeration to say that civilization, as we know it, depends on sulfur bacteria, but not by much.

The sulfur bacteria are important to any discussion of life, as we know it, for two reasons:

*Metal samples that were exposed in an oil pipeline. The samples were used to test the effectiveness of various bacterial inhibitors.*



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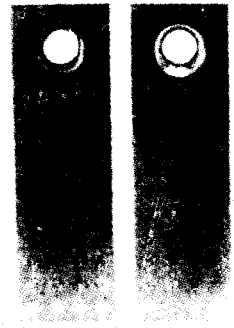

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1) They constitute a complete cycle of photosynthesis-respiration here on Earth, proving that other types of photosynthesis are possible, and

2) Some of them produce within themselves sulfuric acid, one of the most viciously reactive compounds around and handle it with ease. (But not without penalty—as we'll see later.)

There are a number of other types of non-oxygen cycle organisms. A few of these are worth considering in some detail either because they are important in nature or because they are potentially very important economically.

The best-known of these organisms are the nitrogen bacteria, the bugs that make nitrogen available to plants as nitrates. The bacteria take nitrogen as ammonium ions and convert it to nitrites. Other bacteria in the same cycle then convert the nitrites to nitrates. The reactions are:

$$2\,NH_4^+ + 3\,O_2 \longrightarrow 4\,H^+ + 2NO_2^- + 2\,H_2O$$

$$2\,HNO_2^- + O_2 \longrightarrow 2\,H^+ + 2NO_3^-$$

Bacteria use these two reactions for energy, but the bugs that fix nitrogen gas in the first place are, as has been mentioned, regular oxygen-cycle organisms; nitrogen doesn't enter into their energy metabolisms. (Like all other organisms, they use nitrogen to build protein, but that has nothing to do with how they get their energy.)

Another group of bacteria that don't constitute a complete energy cycle in themselves are the methane bacteria. These bugs are primarily noted for being remarkably unfussy about what they eat. They prefer the hydrocarbons produced by decomposing organic matter, but if they can't get them they'll metabolize hydrogen and carbon dioxide. Another thing that makes them worth mentioning is that methane, ($CH_4$) is the only saturated hydrocarbon produced by bacteria.

Two other types of non-oxygen cycle bacteria are being eyed speculatively for their possible importance to man: The iron bacteria and the hydrogenomonads.

As their name suggests, iron bacteria get their energy from iron; specifically they oxidize ferrous iron ($Fe^{++}$) to ferric iron ($Fe^{+++}$) under acid conditions.

If you place these bacteria in an acid solution with a supply of iron sulfide and plenty of oxygen, you get a set of very interesting reactions:

(1) $FeS_2 + 3\frac{1}{2}\,O_2 \longrightarrow FeSO_4 + H_2SO_4$

(2) $4\,FeSO_4 + O_2 + H_2O \xrightarrow{\text{iron bacteria}} 2\,Fe_2(SO_4)_3 + 2\,H_2O$

(3) $FeS_2 + Fe_2(SO_4)_3 \longrightarrow 3\,FeSO_4 + 2\,S$

The ferric sulfate ($Fe_2(SO_4)_3$) oxidizes iron sulfides to make more



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ferrous sulfate ($FeSO_4$) which serves as an energy source for the bacteria, allowing them to make more ferric sulfate. As long as you've got water, oxygen and iron sulfides available, the process will keep expanding.

The metal sulfide in equation 3 doesn't have to be iron; ferric sulfate will oxidize most metal sulfides to their sulfate forms. Because most metal sulfates are soluble in water at low pH, acid ferric sulfate solutions are frequently used in mining operations to dissolve out and concentrate metals from their ores—a process known as leaching. Leaching is used commercially on many metal ores, but because it costs money to replace or regenerate the acid ferric sulfate solution, the process isn't economical on the really low-grade stuff.

The thing about those three equations that puts a gleam in a mining engineer's eye is that the bacteria convert the spent (ferrous) sulfate into a fresh ferric sulfate solution at no cost to the mine owner. With the aid of iron bacteria, it should be possible to process not only the marginal ores, but waste rock as well. The Kennecott Copper Company is using bacterially regenerated sulfate solutions at their copper mine at Bingham Canyon, Utah, and a bacterial mining process for the ores of copper, zinc, titanium, chromium and molybdenum has been patented. A similar process has been used to concentrate uranium from uranium-rich pyrites and the Russians have done some work with a leaching-replacement process on copper ore.

If the process proves successful, it may be possible to dispense with mines altogether. Instead of sinking shafts, or moving hundreds of tons of rock to get at the ore veins, a hole could be bored in the rock, explosives shot off in the hole to break up the rock and the bacteria put to work. An oxygenated ferric sulfate solution would be inoculated with bacteria and pumped into the hole. As the sulfide ore is converted to dissolved sulfates, water would be pumped out of the "mine," the metal-bearing sulfates separated out, the water oxygenated and nutrients the bacteria need for optimal growth added and pumped back into the hole to keep the process going.

Another potentially important use for iron bacteria is the removal of pyrites from coal. Pyrite is, of course, the crystalline form of iron sulfide. Like all fossil fuels, coal contains some sulfur and the coal-bearing rock contains even more, usually in the form of pyrites. Burning coal converts the pyrites to hydrogen sulfide which promptly combines with the water vapor released by combustion to form acids of sulfur. In addition to messing up the furnace, this acid vapor belching from a chimney does nothing



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for plant life or property values in the neighborhood.

If the coal is pulverized and treated with an iron-bacteria culture, the sulfide is leached out as iron sulfate or free sulfur, saving furnaces, noses, and producing iron and sulfur as valuable by-products. In the laboratory, the bacterial cleaning of coal has removed as much as 30 percent of the pyrites and there is no reason to believe that advanced techniques won't allow the bugs to remove even more.

The Hydrogenomonads place in the scheme of things is a little more esoteric. For almost as long as there's been science fiction, the standard method of replenishing the air in the hero's spaceship has been to carry along tanks of growing stuff—algae or higher plants—to convert the carbon dioxide the crew produces into oxygen and a little food. The problem with this method is that it requires a lot of the things that a spaceship will have the least of—space and energy.

The energy is provided in the form of lights to keep the plants photosynthesizing. It had better be pretty dependable energy, too; if there's a power failure, not only does your oxygen system stop producing oxygen, it starts consuming it in competition with the crew. Of course you can get your light by exposing the plants to the sun. That would work fine on the Venus run, but sunlight tends to get a mite thin on the long haul out to Pluto.

The problem of space is even more serious. There just isn't going to be room on the first interplanetary vessels for a garden. Algae are more compact than higher plants, but the best estimates now figure about 100 gallons of algae solution would be needed to process the gaseous wastes of one crewman. Of this 100 gallons about 1 gallon would actually be algae and the rest would be water. It might be possible to wring out a little water, but algae can't be crowded too badly since they have to have light to work. (There's also a weight problem here—assuming the water has to be lifted out of a planet's gravity well. On Earth that 99 gallons of water will weigh just about 792 pounds.)

In 1963 Boeing investigated another system for getting food and oxygen from carbon dioxide. This system electrolyzes water, removes some of the oxygen for the crew's use and feeds the rest of the gas mixture to Hydrogenomonads along with the crew's carbon dioxide. The bacteria would then produce food and water like so:

*Two oil well casings that have been eaten at by bacteria. Note the hole the bugs ate in the lower one. If drillers aren't careful, bacteria can cause the wholesale failure of well casings.*



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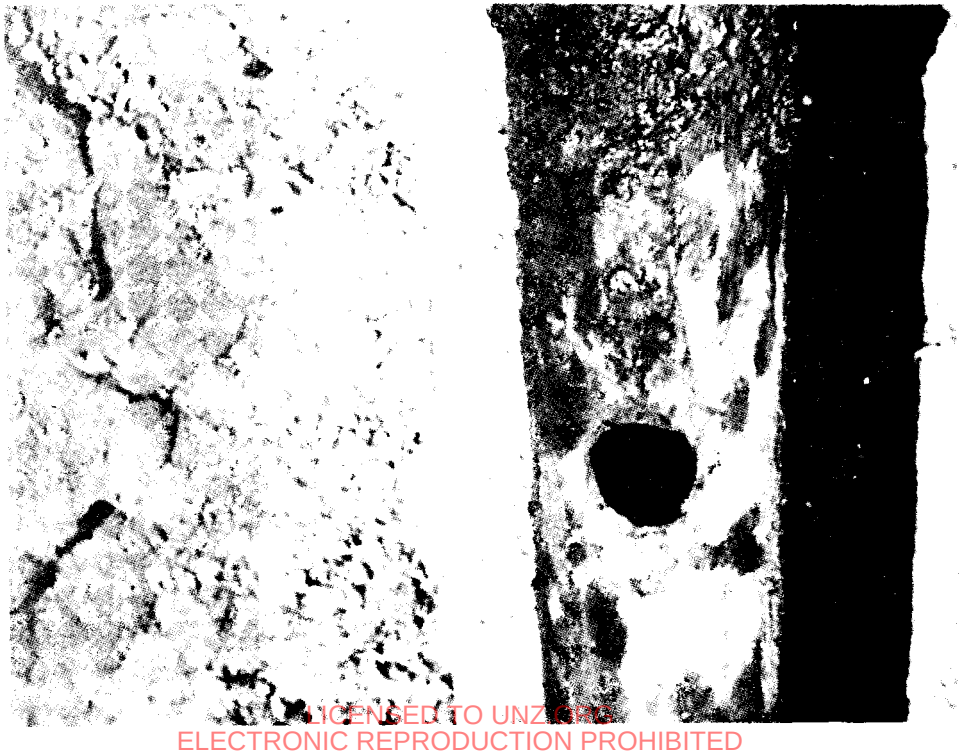

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$$6\,H_2 + 2\,O_2 + 6\,CO_2 \longrightarrow (CH_2O) + 5\,H_2O$$

Since bacteria don't need light for this operation they can be packed more tightly than algae can. What's more, if the power fails they don't start using oxygen rather than producing it. Boeing estimates that dried, the bacteria would contain 57 percent protein and 5 percent fat; the basis for an adequate, if uninspiring, diet.

(Anyway that was the theory. Unfortunately, Boeing apparently never thought to feed the protein to humans and see how they reacted to it. Two nutritionists at the University of California at Berkeley fed samples to eight volunteers and promptly had seven sick volunteers on their hands. Samples had previously been fed to mice, monkeys, chimpanzees, dogs and a miniature swine with no ill effects. It looks like our astronauts will just have to carry algae—water and all.)

All of the life-supporting reactions we have discussed so far have been either widespread or economically important—actually or potentially. Naturally we haven't exhausted all the chemical reactions that support "life as we know it." The important fact is that the number and kind of reactions used by "life as we know it" to obtain energy and the range of conditions under which these life forms can exist are far broader than most people think.

If all these reactions are able to support life, then why is life on Earth dominated by oxygen-cycle organisms? Why are there no sulfur-cycle insects or iron-oxidizing plants?

Energy, mostly.

Being alive in an entropy-prone universe is something like being the sucker in a rigged poker game; if you want to stay in, you've got to keep putting in. For a living organism the ante is energy.

Any truly multi-celluar organism is an energy waster by design. Each time nutrients must be brought to the cell and wastes removed, energy is lost. The more complex the organism, the more of these transferrals must be made and the more energy is wasted. To build something as complex as a human being you've got to have energy to throw away—literally.

With that in mind, let's take a look at some of the life-supporting reactions and the amount of energy they produce.

(1) $6\,CO_2 + 6\,H_2O \xrightarrow{\text{light}} C_6H_{12}O_6 + 6\,O_2 + 690$ kcal

(2) $C_6H_{12}O_6 + 6\,O_2 \longrightarrow 6\,CO_2 + 6\,H_2O + 690$ kcal

(3) $H_2S + 2\,O_2 \xrightarrow{\text{light}} H_2SO_4 + 160$ kcal

(4) $H_2S + \frac{1}{2}\,O_2 \longrightarrow H_2SO_4 + 41$ kcal

(5) $H_2O + S + 1\frac{1}{2}\,O_2 \longrightarrow H_2SO_4 + 118$ kcal



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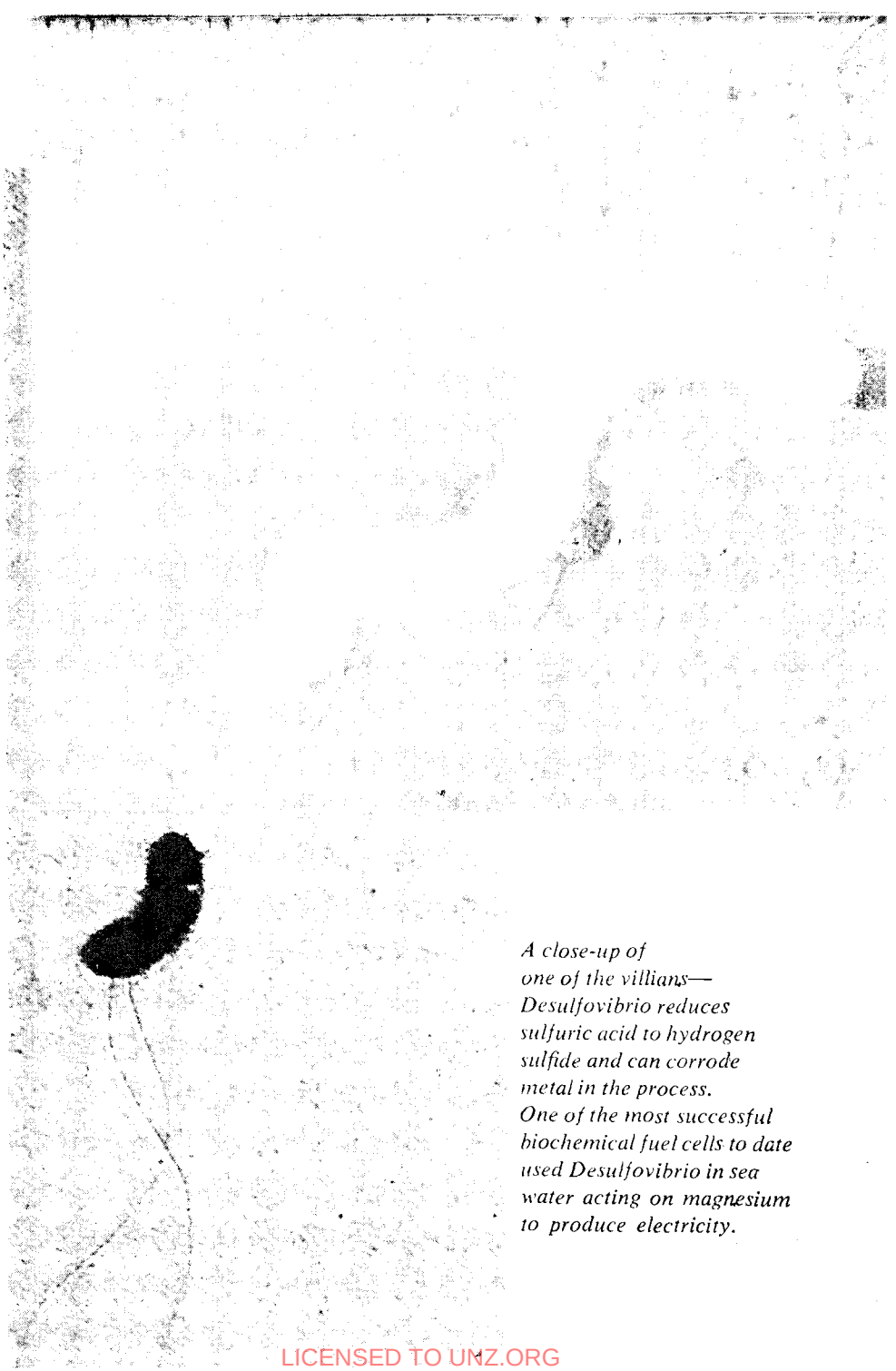

*A close-up of one of the villians— Desulfovibrio reduces sulfuric acid to hydrogen sulfide and can corrode metal in the process. One of the most successful biochemical fuel cells to date used Desulfovibrio in sea water acting on magnesium to produce electricity.*

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(6) $HNO_2^- + \frac{1}{2} O_2 \longrightarrow HNO_3 + 17$ kcal

(7) $NH_4^+ + 1\frac{1}{2} O_2 \longrightarrow HNO_2^- + H_2O + H^+ + 66$ kcal

(8) $H_2 + \frac{1}{2} O_2 \longrightarrow H_2O + 56$ kcal

Equations one and two are, of course, the photosynthesis-respiration reactions of the oxygen cycle. As you can see, these reactions are good for a whopping 690 kcal apiece, head and shoulders above any of the others.

Oxygen-cycle organisms nearest competitors in the energy derby are the sulfur-cycle bugs. The reactions that form the basis for their existence are good for less than one third as much energy, making complexity hopelessly extravagant. By the time you get to the nitrogen organisms you're in real trouble.

All other things being equal, the various non-oxygen-cycle organisms can't produce as much energy per mol of reactants. To make matters worse for the exotic-metabolism organisms, all other things are *not* equal and one of the things that is decidedly unequal is the efficiency with which organisms use the energy available to them.

To date the best evidence indicates that the exotic-metabolism bugs evolved from oxygen-cycle organisms. Now oxygen-cycle organisms are notoriously efficient. They manage to use about 98 percent of the energy their metabolisms produce. The exotic-metabolism bacteria are nowhere near as efficient. Nitrogen-cycle bacteria average only about 5 percent efficiency and lose the other 95 percent of the energy they produce as heat. Hydrogen bacteria manage to use about 25 percent of their energy and most other non-oxygen-cycle bugs fall between those two extremes.

Other bacteria such as the ones producing sulfuric acid have the added problem of keeping violently poisonous environments out. Even the sulfur bacteria that live at ultra-low pHs have protoplasmic pHs of about 7. They keep it this way by pumping out the sulfuric acid as fast as it is formed, a process that uses a good deal of energy.

Because their basic energy reactions are so inefficient, non-oxygen-cycle organisms have been driven to the fringes of life-as-we-know-it. Oxygen-cycle organisms can grow faster and reproduce more rapidly, smothering any non-oxygen-cycle organisms that try to compete directly—that's why they dominate.

Remember though that the inefficiency of energy production is largely relative. Non-oxygen-cycle bugs are rare on Earth because they have to compete against oxygen-cycle organisms. Without oxygen-cycle organisms to crowd them, their inefficiency would be a lot less meaningful in terms of survival.



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Without oxygen-cycle organisms around, the non-oxygen cycle would undoubtedly have evolved much more complex and highly organized forms than bacteria. (Of course we would still have the problem of absolute limitations on size and complexity imposed by the amount of energy available—and the amount of heat that has to be dissipated—but these probably aren't too restricting.) There's no evidence that Earth ever produced an oxygen-cycle organism that approached the absolute limits of the cycle and even if it has, something one fourth the size of a blue whale is still plenty big.

Moreover, as our space probes have made abundantly clear, conditions on other planets are anything but Earth-like and probably not even marginally suitable for oxygen-cycle organisms.

If life exists on other planets, it could easily be an elaboration of the non-oxygen-cycle life of the sort found on Earth. In addition to non-oxygen-cycle bacteria similar to the ones we know, it would probably include the equivalent of animals and plants. In fact there's no reason not to assume something as complex as a man, if you're willing to settle for a creature with an extremely slow growth rate.

Our concepts of "life as we know it" are built around organisms that evolved to fit conditions here on Earth. If conditions-as-we-know-them had differed slightly, what we think of as "life-as-we-know-it" might be a series of biological oddities struggling along on the fringes of the biosphere while other organisms based on principles that are rare on Earth would hold the center stage.

As I say, I don't know if there is "life as we know it" on Mars, but I'll bet you a beer there is. ■

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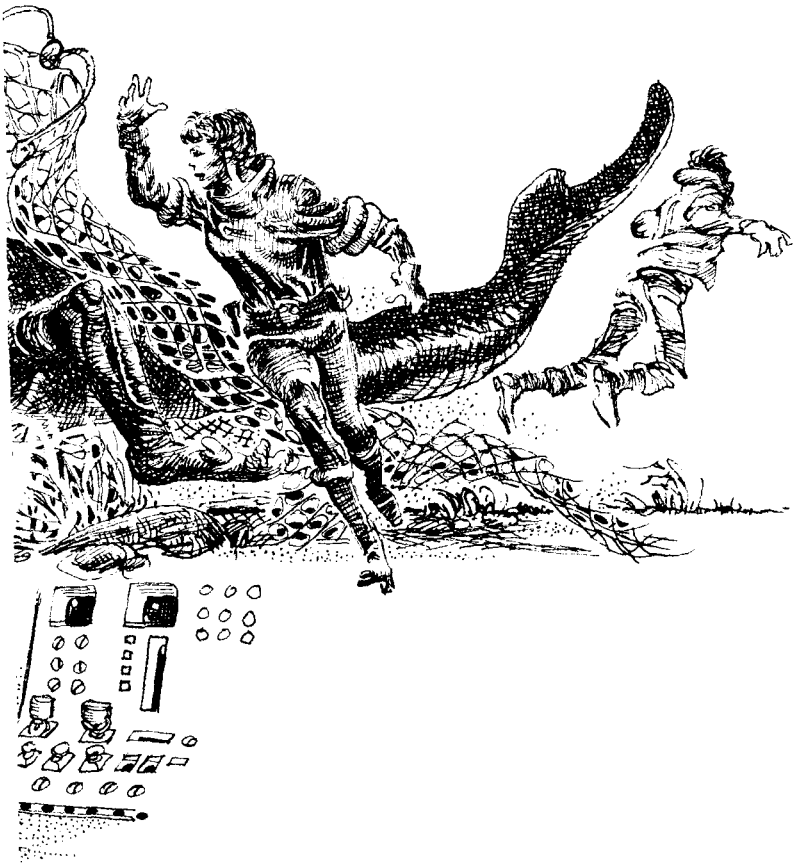

# IN THE WABE

*Any exploration of a frontier is dangerous; characteristically, it means finding new and unexpected ways to die. But this mission had an old and unexpected way to die—*

**ROBERT CHILSON**

*Illustrated by Leo Summers*

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The nameless planet's newest and most deadly species arrived at dawn, a swarm of aerials lifting and circling above the two still forms. The aircar landed with but a swish of coarse, dry grass. Two Scouts emerged, then the Team commander, Gunter Sirdey, who stalked stiffly over to the bodies.

It was not immediately obvious which had been Keough and which Simms; the Penetration Service working dress had no insignia and all exposed flesh was gone. The aerials worked fast. Sirdey's lieutenant of Scouts, Ellyria Chang, handed icons to the Scouts and they began to record the scene almost inch by inch around the bodies, to a distance of twenty feet. The dome tent of the outpost was just twenty feet from the dead men. A couple of medics had emerged and were bending over the bodies as Vixie Anthony came out hesitantly. The Scout lieutenant nodded wordlessly to the younger woman.

Just then one of the medics frowningly unsealed a shirt. A crouching, concealed aerial instantly lifted a blood-covered head, leaped into the air, and pounded desperately away. Vixie's face went white; she pushed past Ellyria and stumbled blindly around the aircar to be helplessly sick. The Scout lieutenant, though the younger woman's reaction weakened her own self-control, methodically dug out a cup and filled it with water from the cooler. This she took to Vixie, steadying her with an arm around her shoulders.

"How c-can you people stand it?" the redhead whispered weakly.

"We don't like it any better than you do," Ellyria told her. "It's a matter of self-control." She studied the white face with its broad stripe of tiny freckles reaching from cheekbone to cheekbone, almost from ear to ear. The beautiful red eyes were focused on nothing. "You never get used to it, but you learn to stand it. On your next planet, you'll be as steady as any of us."

Vixie shuddered. "Not me," she said. "Next time he can send Lynn."

Ellyria's forehead wrinkled. "I've never really understood why you came."

"I know. I'm not trained in any kind of penetration work, but Vandine Combine couldn't spare any observers on such short notice. So they called us. I've had experience on a lot of planets with Dan, and he's always willing to cooperate with Vandine."

"I have heard that the Royal Independent Company was connected with Vandine."

"Not formally, not anymore. Dan Macon was Vannivar's partner in an enterprise when I first met him. But where did you hear that?"

"Penet Service depends on the Combines and planetary govern-



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ments for its very existence, not to mention the funds and equipment for operating. We make it our business—have to—to know as much about you as you do about us."

Gunter Sirdey inflated a pair of stretchers and the medics, finished with the preliminaries, carried the rags of bodies to the car. They were sacked and strapped to the floor. Brereton, a Scout taking training in microecology—soil—volunteered to hold down the post. Langtry, the other Scout, joined him. Sirdey glanced at the striped, dull-yellow dome and said, "No. We'll leave it on robo. Deflate the dome."

They glanced at each other but said nothing. The inflated spars of the geodesic frame hissed as the air left them; the camouflaged dome sagged. Elly Chang, leading the girl from the Independent Company, came around the aircar's bow. She caught his eye questioningly.

"We can't risk any more personnel loss," he told her woodenly. "Much more of this and we won't be able to complete the penetration of the planet." The redhead gulped. He looked at her curiously; her whitening face made the band of freckles stand out boldly under her wide eyes, making her look like some masked animal. "We'll switch all meadow outposts to robo, at least until we find what's causing our losses," he said abstractedly.

"If there *is* anything," said the Scout lieutenant.

"It's no coincidence," said Sirdey grimly. "Seven fatalities, all on isolated outposts in the meadows, in one month. All without the smallest clue to the cause. In a Team this size, we usually only get seven or eight fatalities in a Standard year."

There was a moment of bitter, brooding silence while the Scouts folded the tent and bundled it into the car beside the remains of its late occupants.

"The best Scout on the Team, too," muttered Elly moodily.

"Simms was a good man, too," said Sirdey soberly.

And that made them think of Jim Halder; the Penet Team had never quite got over his death—especially Ellyria. He had been their other Lieutenant of Scouts; a good thing for her she had all his work to do in addition to her own. Between him and Catia Husak, their best botanist, the Team had seemed crippled at times, though there were enough botanists and trainees to take up the slack. And Penet men got very good training; the lack of one Scout lieutenant was not critical. But there was a distinct difference in the tone; Jim Halder had had an air that neither Elly nor he, as Team commander, had.

They reentered the aircar silently, stepping over the spray gun mounted in the door. The car lifted off and reached for altitude and speed, and the "meadow," an area of typical prairie, covered with



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yellow grass and low scrub and small trees, gave way to the forest. There was no intermediate zone; the transition was as abrupt as a cliff. The forest was a typical temperate-zone forest, neither rain forest nor jungle.

There was nothing unusual about either forest or meadow; what was odd was their proximity. The planet's entire temperate zone was light forest heavily mottled with such meadows, frequently fifteen by twenty miles long, scaling down to little spots half a mile across. The Penet Team had dubbed the planet "Freckles," though, of course, it would not be officially named until a group of prospective colonists got together and incorporated.

The Penet Team's base camp was in a forested range of hills, on top of a particularly craggy one, inaccessible except on one side. Even in the hills there were meadows, though much smaller than in the flatlands.

Sirdey saw to the disposition of the bodies, called up Arn Kielgaard to perform the autopsies, and strode blackly to his office, cursing the luck that laid up Doc Joubert when he was needed the most. Not that anyone's autopsy would tell them anything. His wife, Sana, was waiting with a tray of sandwiches; she had got up when the correlation robots awoke him to report that the Scouts at the stricken outpost did not answer.

He nodded to her wordlessly, not feeling like discussing the tragedy, stepped to the unicom and punched "General Attention." His words went out by satellite relay to the secondary camps on the other two continents, and to all stations and outposts on all three. On the night side, coms recorded them; "Alert" would have awakened all Team members, but that was not necessary. Tersely and tonelessly, he announced the tragedy, gave what details were known, and stated that funeral arrangements would be announced after the autopsies. While he had their attention, he added that all meadow outposts were to be abandoned to robot monitor beginning immediately.

Sana knew him well enough not to mention the topic. Drawing a cup of heaven-tea from the dispenser, she said, "We've completed a preliminary on the flora differences of meadow and forest."

"Have you found why half the land won't grow trees?" he asked tiredly, not tasting his sandwich.

"Not yet; the mystery deepens. Listen to this: of two hundred and fourteen plants found growing vigorously in the meadows, *not one* has been seen, even stunted and sapped, in the forest. That includes everything from grass, through brush, to those small trees that dot the meadows."

Sirdey looked at her. "That's one for the records," he said. "How about plants normally found on the



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forest floor? Have any of them been found in the meadows?"

"Not so far, and the correlation robots bet we won't. I agree, but checking all the weeds in the meadows is not an easy job."

"You've checked everything, of course," he said, and ran through the list musingly. "Fertility, rainfall, soil count, soil number, sunlight, cover. But the trouble is distinguishing between effects and causes."

"Fertility and rainfall and sunlight are identical, cover extensive in the forest but sparse in the meadows. The soil count is markedly lower in the meadows, naturally. The forest has a low soil number and the meadows a high. That may be it, but it may just be an effect. Forests are usually acid, prairies frequently alkaline, though not forest meadows."

Sirdey recalled having heard of the difference in soil number. "The difference is not great here, but such small differences are frequently ecologically significant. Soil acidity is usually a function of decay, which would be higher under the trees. A single year's fall of leaves would probably kill off the meadow in a given spot, but there must be some preventive factor. A different decay cycle, perhaps, or something that blots up acid. It will turn out to be one of those fearfully complex ecological mechanisms that make me wish I'd joined Exploration Service instead. I wonder what connection there is between it and the killer agent in the meadows?"

Husband and wife looked at each other for a moment, thinking, then Sana said, "There can't be any direct connection; the killer agent is not that widespread or our losses would be ten times as high. But it *must* be an integral part of the meadow ecology."

He nodded gloomily; they'd come to that conclusion a long time ago. It might mean destroying the meadows entirely; a simple matter, that, once the ecology was unraveled. More likely the ecology could just be altered. He always liked prairie for first settlements. Usually the simple ecology compensated for the lack of rain. Here there was no lack of rain—or sun—and the ecology was consequently more complex, but the physical advantages were still great. It would save cutting and disposing of trees, allow uninterrupted fields of view for spotting carnivores, permit the agrirobots to get the first crop in the ground immediately, and so on.

With literally millions of colonists landing in a couple of years' time, every shortcut to building a minimum network of industry must be taken; hence agriculture for food staples. Colonies have to be self-sufficient in everything from fibers to machine tools within a decade, able to start paying off



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their debts, or they fail. Fighting the forest would tend to slow them unless they gambled on widespread destruction of the ecology.

Sirdey did not want to have to destroy the meadows, but at the moment considerations of morale made it impossible to continue the study of them.

His dark brown brooding was interrupted by Ellyria Chang with a handful of record cards, her golden face expressionlessly intent. "Wyan has finished his report on grazing animals, but he says he's not satisfied with the conclusions on their food supplies. He wants half a dozen Scouts assigned to him, full-time, to watch them and prepare an estimate on what percentage of their food is found in the forest. He thinks it's over, rather than under, fifty percent."

"Give him two."

She grinned impishly. "Ralph Putnam called from Northeast. He was upset about abandoning the outposts; said it'll cost him a whole project on the soil ecology. It'll take another week to complete it."

"It's night over there. What's he doing up so late?"

"Going to give him a week?"

Sirdey went grave. "That continent is almost all prairie, and all our losses, but Teroa, have been in the meadows. Didn't you and Ralph agree that the meadows were isolated areas of prairie, identical in every important way?" he asked Sana.

"Yes. But the meadows on these two continents have heavier rainfall."

Freckles' three continents were all in the southern hemisphere, Northeast sprawling a short distance across the equator. It was the driest; Southwest's southern points and outflung islands reached the subarctic and it was the wettest, largely covered by trees. The continent chain reached three-quarters of the way around the nameless planet, and though they were not large, a great number of islands of all sizes brought the land area up to a quarter of the planetary surface. The islands and continents were all well-watered.

"Come to think of it," said Sirdey, "the e haven't been any losses on Northeast. If it's the meadows that're killing our men, it should have the highest losses."

"There are more of us here on Middle."

"True." Middle was the largest continent, half forest, half meadow. He hesitated a moment, said, "Very well, he can ask for volunteers for this project."

"Brace yourself," said Sana, drawing more tea. A rumble, as of a volcano, heralded Beri Cavour, a big brown bear of a man with his arm in a sling. It was he who had rescued Doc Joubert, the Chief Medical Officer, from the carnivore from under which he, in turn, was trying to pull Teroa, a Spec. Cavour had not been badly hurt; they



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had wrapped up his arm, bedded him for a day, and given him a mild regeneration treatment to speed the healing. One result had been to regenerate the destroyed hair follicles, and as he had not re-depilated yet, his lower face was covered with a coarse black stubble, a sight to daunt the boldest Scout.

"Gunter!" he bawled, fixing his eyes on his commander. "What's this nonsense about abandoning the outposts? You're not going to bring in the instruments, are you?"

"We'll put them on robo."

The Chief Maintenance Officer kicked a chair over in front of the desk, picked up a sandwich, and nodded at the dispenser. "Wasn't sure," he rumbled, around about a third of the sandwich. "Just got up. Romita told me." He swallowed. "What a thing to hear before breakfast." He half-emptied a cup of heaven-tea and scowled at it—his personal cup held three times as much—but said mildly, "We can't do it. We haven't got enough transport to service all the meadow outposts more than once a day. And, even if we could do it twice a day, it would still double the length of our stay."

Sirdey sighed. "I know," he said somberly. "We'll just have to do the best we can with what we have. We can't risk any more losses just yet."

"Odds are this won't decrease the exposure any," grumbled Cavour. "How can you avoid a danger when you don't even know what it is?"

That was one of the primary purposes of the outposts. They contributed as much to the knowledge of a planet as the sorties. Ostensibly just a group of sensors monitored by a robot that relayed all data to the correlation robots, they usually included a tent and at least one Scout on duty. His purpose was to adjust, or replace, sensors and move them around at the orders of the correlation robots, to move and set traps and examine and dissect the bugs and small animals caught in them, and the like—nothing that couldn't be done by robotic equipment, but robots with such versatile waldoes are complex mechanisms with many moving parts. They have no business in the field.

The sensors detected vital data—winds, precipitation, air pressure and temperature, humidity, light-intensity, gravitic and magnetic variations, ionic content of the air, soil temperature, animal sounds, and so on and on. In addition, icons recorded the passage of all animals and all their activities; other icons focused down on small areas and recorded the activities of bugs and other small life, and plant life cycles. The correlation robots sorted the data as it was observed and tried to correlate life activity with time of day and hundreds of



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other variables, constantly watching for data bearing on hundreds of questions.

Except in total volume of data digested, the result was inferior to human observation, due to the machine's lack of judgment. Most of the key data on every new planet was discovered by Scouts at the outposts, ostensibly doing nothing, actually watching, and setting up sensors to watch, the movements of animals, the flights of aerials, patterns of growth of plants and which are eaten and which not by the local animals; bug dens, diseased plants, fungi; and scores of other things that caught their highly trained interest.

Vital clues to penetration of the planet were constantly being turned up. Though officially the lowest-ranking members of a Team, usually Specialists in training, it was the Scouts who made penetration work. Hence the Service's tradition of saluting Scouts first. Pulling in the meadow outpost Scouts would cut off most of that information.

"What you need is a wife," said Elly to Beri, setting a full cup in front of him and drawing a finger along his scruffy jaw.

He tousled her soft black curls with his big, blunt-fingered paw. "You volunteering? When I was a Scout, I learned not to volunteer for anything." He swung around and greeted Vixie Anthony. "Look at this bandit," he said to Elly. "She volunteered for what looked like a vacation on a paradise planet and got sent to this hole in space. Be warned!"

"What is it?" Sirdey asked her.

The redhead said, "There are about fourteen people waiting to give you reports; they thought you were in special conference on the—tragedy. Carnaby has a line, I think, on why some areas are forest and apparently identical areas are meadows."

"I can tell you that," said Cavour, washing the last of the sandwiches down with a final cup of heaven-tea. "Freckles is diseased!" He lumbered out.

Sirdey stood up to follow, already dreading to meet the Team, knowing what its morale would be. "Let's go face them," he said unhappily, and they followed him out into the Operations Room, Sana shaking her head over her husband's breakfast—a sandwich and a half.

A Team commander does not, of course, have time to read the millions of words of frequently highly-technical reports produced in a year or more of indepth investigation of a whole planet. Penet Service's philosophy was file it and forget it—the records were turned over to the colonists. The commander had to know what was happening, of course, but verbal briefing was sufficient. Hence his true office was the big Operations Room, with its correlation robots,



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assorted testing equipment, ecological charts, planetary maps, models, seawater and botanical and micrological tests for which there was no room in the labs; flowering plants, fossils, bones, mineral samples, first-aid kits, empty cups, half-eaten sandwiches, hats without owners, and similar impedimenta; the tracks of hardworking men and women who value—and get—results more than a "business-like" atmosphere.

Carnaby, a tall thin man with bushy red eyebrows and hair, the Team's best biochemist, had been studying orbital photos and aerial surveys, spectro-studies of the forest and meadows. "I have some evidence here tending to prove that the forest is replacing the meadows," he began. "Apparently some inhibiting factor in the meadows prevents young trees from rooting; perhaps the slight alkalinity, probably the ecological complex, whatever it is, that maintains the alkalinity. Outstretched limbs of adult trees drop leaves and twigs on the meadow edges, building up enough duff to flip the soil over to acid. If it weren't for the ecological complex that maintains the alkalinity, the meadows and prairie would all have been gone long ago. The meadow ecology must be a tough web."

Sana laid down the graphs and charts he had made. "You're buying Ralph Putnam's thesis that the meadow ecology evolved on Northeast and the forest ecology evolved on Southwest, then," she said.

"Not exactly . . . but it will probably come to that in the end. Any objection?"

"No. His argument that animals conspicuously adapted to the meadows evolved on Northeast and those conspicuously adapted to the forest on Southwest, is good. But now you're saying that the forest came up the easterly wind belt and got a substantial foothold on Northeast, almost a quarter of the continent, before it succeeded in overrunning Middle. It only half covers this continent."

Carnaby shrugged. "It's not my argument; let Ralph worry about it."

Sana frowned at nothing. "Still, I have a feeling that we're missing something important here."

After a moment Carnaby said to Sirdey, "I've already checked the correlation robots for their data on the meadow ecology; so far they have only the superficial pattern. The key is in the soil ecology. I'll wade as far into it as I can on this new slant, but I'm only a biochemist; it needs a microecologist—soil bacterial count, bugs, worms, burrowing animals; the whole energy-flow cycle. Who can you let me have?"

Sirdey had an uneasy stirring at the thought of any immediate sortie into the meadows. Team morale would collapse if there was another death so soon after the



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double tragedy. He had [illegible] many drawn faces and heard the little of their [illegible] banter that morning as [illegible] this time Carnaby could [illegible] one of the victims they could afford to lose any more of [illegible] specialists.

"I think you're overemphasizing somewhat," he said tolerantly. "You assume that since the forest must be replacing the aboriginal prairie, simply discovering this inhibiting factor will give you the key to the planetary ecology. Besides, I remember some surveys showing rather large patches of weakened or dying trees. I believe someone—you, wasn't it?—proved by the spectros that they weren't diseased. Could it be that the meadows are replacing the forest?"

Carnaby shook his head. "Mayly Kara has been checking on those for me. She says they're all areas where fire went through. Creeping groundfire is common here; thunderstorms, you know. Most of them will recover. Individual trees may die, but the forest will survive."

Sirdey hadn't heard that. He said, "Still, I think you're oversimplifying. We don't yet understand the ecology of the forest, either. Not that there seems to be anything mysterious there, but you know just how subtle any ecology can be. Your inhibiting factor may be in the forest."

Sana, the ecologist, nodded [illegible] be confined to [illegible] must be [illegible] them—pollinating [illegible] spores [illegible] something. I've seen planets like that."

"Well," said Carnaby, uncomfortably, "you [illegible] about ecology than I do."

"Ralph is in the middle of a prairie-soil micrology project right now," said Sirdey. "Most of our micrologists are tied up in that and other ones. I can let you have Sana just now, and Brereton. This should put him up for Spec rating," he added to Filly. She nodded. "And, if you can get anyone to volunteer, you're welcome: you have Mayly Kara already. But, since Ralph is already working on the prairie, do up a good analysis of the forest ground-level ecology—the whole cargo, not just soil. No point in duplicating effort. Later we can put the pieces together."

He had used his official Team commander tone. They looked at him a moment and nodded wordlessly.

The next report was by Broughton, another biochemist specializing in medicine. It was more like the ones Carnaby usually turned in—an elaborate and dry account of Freckles' protein population. On charting the planet, Exploration Service had spectroed it to get the



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general range, so that the first Penet men who stepped out on it wouldn't drop dead just from breathing the air, but the complete analysis had to be done on the surface. Some planets had to be bypassed completely because their evolutions were built on incompatible proteins.

While he was listening and picking out the main points that were all he could understand or needed to know, Pat Shih, a Scout medical-trainee he knew slightly, came in with Langtry and laid an apod on a table in front of Sana. Sana interrupted her preparations for the project and examined it. It was between three and four feet long and quite thick for an apod, with bark-patterned skin and an outsized head with outsized jaws filled with outsized teeth.

"Arboreal," explained Pat.

Sana pried an eyelid open. "Carnivore," she explained to Vixie Anthony. Vandine's observer had been helping her. "Apods usually evolve from burrowing or ground-living animals; and the burrowing niche is occupied by those echinodermous armored moles. Forced out of the ground in competition, I'd say, and evolved carnivorousness after taking to the trees."

"You said there was a gap in the ecology," observed Pat. "When I saw those teeth, I figured this would fill it."

"Yes. We'll have to find out whether it's nocturnal, diurnal, or both; whether or not it has color vision, how well it can hear, and whether it's oviparous or viviparous to determine its exact place in the ecology."

The Scouts took the apod off to the labs. Vixie asked, "How did you know there was such an animal in the forest?"

"For one thing, forest aerials either den on the ground, in logs or among rocks, or they build nests high up and far out on slender branches."

After a moment Vixie said, sounding lost, "Sana, how can you go about your work after the last tragedy, especially knowing that another victim may fall anytime? Why aren't you looking for the cause of the deaths?"

"We already know we don't have enough information," said Sana gently. "Our work itself will reveal the killer agent sooner than any specific search could. When we have the planetary ecology unraveled it will be a simple matter to feed in the necessary characteristics and have the correlation robots tell us where to look for the agent. Even then it's doubtful if there'll be any record anywhere of it; there are too many potentially deadly things on any new planet. Now, if we had a sample of the poison, we could take a spectro of the meadows and spot the killer that way; we have some fantastically delicate instruments. Anything less than that would be futile."



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The redhead's voice came lowly, "So no one will bother to try to find out what's causing these deaths?"

"We consider any direct search a waste of time. As for the possibility of more deaths, we've done what we can in abandoning the meadow outposts. Planets are bought with blood; we all knew that before we joined the Service."

When he had heard the morning's accumulation of reports, Sirdey helped Ellyria Chang with the reassignment of the Scouts pulled out of the meadows. Specialists with forest projects had a day to remember in requisitioning personnel, but when they enthusiastically began to set up new outposts, he had to call a halt; there were only so many sensors and monitors, and even manned outposts had to be visited frequently for various reasons. They didn't have enough transport.

Then he had to help Beri Cavour set up a servicing schedule for the meadow outposts. They had aircars enough to service all once a day and to spare, but the slack wouldn't stretch enough to permit all to be serviced twice a day. They pulled it as tight as they could, alternating daily and twice-daily service at some outposts, and managed to get by without shutting any down.

But, he thought as he shuffled wearily into the lounge in search of food, there was not going to be enough play for the inevitable interruptions in the schedule. Accidents, he thought, emergencies, and sudden urgent demands for transport—frequently to bring in specimens. They all seemed to be big, carnivorous, and ragingly alive. Sooner or later he'd have to shut some of them down.

If only they had some clue to the nature of the killer agent. One thing they were certain of was that the killer was poisonous; a rare and instantly fatal nerve poison. *Instantly* fatal; on every Penet Service utility bracelet was a separate fingernail notch for medical emergencies, and every Scout is taught the symptoms of poisoning—by experience. It's one of the most common causes of death on new planets, frequently caused by harmless plants or animals whose leaf powders, or exoskeletal waxes might be anything but innocuous to offplanet men and animals.

The trouble was, there was no pattern. It was not just a matter of checking the area near where they'd fallen; Wells and Jali Kileng were found in their tents, Keough and Simms just outside theirs. Jim Halder had died in his aircar, inspecting outposts and servicing a number that were still on robo. Bella Arnimian and Catia Husak were the only ones who were actually found out in the field. The rest must have carried the poison back with them.



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The timing was equally without pattern; Kileng, Wells, Jim, and Bella had all died by day; Catia, Keough, and Simms by night. And weather; Catia had been out servicing sensors in a thunderstorm in that little two-by-three mile meadow where she was conducting one of her unsurpassed studies of meadow flora. Others had died on windy and calm days and nights, on clear and lightly overcast days.

Either the killer agent, he concluded again, was ubiquitous with respect to weather and time of day or night—like a plant—or there was something there they'd overlooked. The correlation robots had analyzed the complete record of every sensor at each death site beginning several hours before estimated time of death and continuing several hours after. They had been unable to find any pattern in such things as magnetic or gravitic variations, stellar flares, and so on.

If only the poison didn't break down so fast. Jali Kileng had been found within an hour and a half of death, yet there was no trace of the poison.

That night Gunter Sirdey slumped into his office chair, boneweary after one of the most trying days of his life. That afternoon, while he was trying to bring order out of the chaos created by the decision to abandon the meadow outposts, Ralph Putnam, in charge on Northeast, had called up Sana to protest vociferously Carnaby's theory that the forest was replacing the meadow, for no good reason. For no better reason, she had defended the idea spiritedly. At the height of the argument, Elly Chang had come in with a drawn look and proceeded to jump down both their throats, claiming that neither could be supplanting the other, that both evolved side by side on all three continents.

Elly's only fault was an occasional fit of temper like that, not always bad, as it frequently cleared the air. She had grown more erratic, her temper a greater liability, since Jim's death. This argument rapidly had reached the acrimonious stage, where it raised more tensions than it released, and he had had to break it up.

Then Beri Cavour had come in, raging. He and his technical department had been sitting up late at night, building free-floating sensor-buoys to check on the great herds and schools of fish in the northern oceans; Sirdey's pet project. He had just learned that two Specs had lost a whole carload of them. They were down on the surface with the tail doors open when a sudden subsurface eruption turned the aircar over, flooding and sinking it. They had clawed their way to the front and saved the car— and themselves—but the load of buoys was gone. Not having been instructed as to what depth to maintain, they simply went to the bottom.



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The components were irreplaceable, of course. Cavour, cursing the whole contaminated planet, did not mention the wasted work. But he did say that the ocean survey would have to be abandoned until after the next ship planeted with more supplies, and that, of course, was completely unacceptable. The whole Team was on the edge of breakdown, thought Sirdey morosely. Maybe Beri was right; maybe the planet was diseased.

It was late and the lounge was nearly deserted when Sirdey got around to eating lunch the next day. Vixie Anthony came in shortly after he did and, with some hesitation, joined him. She had been rather shy about bothering the more important Team members, though as official observer for Vandine, a heavy supporter of the Service, she was free to investigate anything that caught her interest. The Services did not attempt to hide their cost/effectiveness or even their techniques, many of which had been adopted by various industries.

"What can I do for you today?" he asked her. He hadn't done much for her yet; she didn't seem to be conducting a very thorough investigation of them. She certainly wasn't much like the trained observers they usually got from the Combines. Odd that Vandine should have sent her.

"Oh—nothing. I mean, I'm satisfied with what I've seen of your methods. I was just wondering, though, why you don't mount a special project to discover the killer."

"You said something like that to Sana yesterday," he remembered. "We did; the correlation robots are programmed to look for data bearing on that along with everything else. Every so often, they go through all the data we have to see what can be worked into a consistent pattern, or if at least some classes of possibles can't be eliminated. The answer is always the same; insufficient data."

"That's what I meant; why don't you look for the necessary data?"

"We were," he said somberly. "Every Scout and Spec in the meadows had the problem in their minds all the time. But their kind of random search couldn't pay off until we knew more about it; we not only don't have a trace of the poison, we don't even have any of the primary breakdown products."

"Is that kind of—random search—the only kind you can make?"

"Actually, it is; without more data, what specialty would be likely to turn up the answer? We'd have to search every category. Some are larger than others, but the largest, bugs, numbers millions. Plants are not so numerous, but still—" he shrugged. "We can't even look for the usual poison indicators such as thorns or stingers, since the agent



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[illegible]

[illegible]

[illegible]

termine the proper setting," he added. "Specific stimuli, species-adjusted, can have quite specific effects on known bugs; it can sterilize or increase reproductivity, for instance, or cause all gravid females to lay eggs out of which will hatch only a given sex of bug, and the like."

That was not all new to her. She nodded thoughtfully. "Doesn't the type of poison give you any clues?" she asked. "Dr. Joubert said it must be very rare; that it was the fastest-acting poison he'd ever heard of."

Sirdey had a sudden feeling that there was something important there. It eluded him. Frowning, he said, "That's right. None of us have ever seen anything like it." The feeling came again, stronger. "But remember that every planet has hundreds of compounds found nowhere else. Planets with so deadly a poison are rare, but we just happened to hit the jackpot. You've heard of the ratepillars of Faerie, of course."

"Yes, I have."

Again he had that tantalizing feeling.

"Any progress to report?" Gunter asked Sana next day.

She shook her head. "The correlation robots are making all the progress worth mentioning. You know that big section of swamp on the northern part of Southwest? They say it should not be drained until it has been very carefully investigated. There's a flying and biting bug there that's one vector of a disease that keeps wood-eating moles in check. Without such checks—and there's no knowing how many others are maintained by the swamp—the moles will ravage the forest. They eat the bark off the roots."

The swamps covered a fifth of the continent—the warmest fifth. Sirdey said, "Can we exterminate them?" Anything that ate wood had a low negative rating, functionally positive because it returned nutrients to the cycle—he caught himself. Bark eaters cause a great deal of disease in addition to their own damage, killing enough trees to give them a disproportionately high negative rating. They were needed to maintain the growth and death cycle of the forest, and all kinds of niches and subecologies would depend on them to make clear spaces available for various important ground-level plants.

"We'll have to find substitute vectors or maybe diseases," said Sana.

Sirdey nodded. "Any idea how many vectors there are?"

"The robots just said one flying and biting bug; that usually means there's half a dozen vectors. We don't have enough data yet to be that specific, I think."

Elly Chang came over to their table. "Ralph's already getting results on Northeast. You know those little mice we found all



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over the meadows? They're more important than we thought; they're not only at the bottom of the food chain for all meadow predators, they're what keeps the cellulose grass in line. They eat the nitrogen-fixing bulbs off the roots, killing the grass and forcing it to seed early. They'll be exterminated by colonization."

"Anything wrong with that, particularly?" asked Sana.

"Not in itself; they'll just have to be replaced; they mainly eat bugs. Point is, agriculture will largely wipe out the cellulose grass; it's got too tough a root-complex. They'll replace it with more efficient off-planet legumes. But the mice depend on those bulbs for all kinds of vitamins. You know that when farmland is abandoned under competition from sea farms and food synthesizers it won't just go back to the native state. The mice—and quite a few bugs, too—will have to be replaced."

"That's simple enough, or will be when he figures out the ecology," said Sirdey. Every planet has its equivalent mice, moles, and the like, each unique yet all alike. It was no tragedy for a given type to become extinct; it could be replaced with a little selective breeding and adaptation of off-planet equivalents.

"He hasn't found any . . . clues, has he?"

Elly shook her head. "Vixie Anthony has flown over to Northeast to watch the project. Beri Cavour arranged it, on account of the tight schedule. He said she was asking him about spectro-searches for nerve poisons. It's funny she'd concentrate so on the killer agent."

In the Ops Room that afternoon, Sirdey found Beri Cavour, the busiest man at Base, sitting alone and drinking heaven-tea. Maintenance must be temporarily ahead of what Beri called Erosion. The Ops Room was nearly deserted, a couple of Specs at the correlation robots. There were rarely many here at this time of day, but this was unusual.

"Where is everybody?" he asked, joining Beri by the dispenser.

"Down on the west coast. A couple of Scouts at an outpost down there saw one of those big herbivores Sana calls 'wopperjaws' come ashore. They had an idea it had island-hopped all the way from Southwest. They live in the swamps, you know."

"So they've all gone down to catch it?"

"Check. Sana said something about examining its internal parasites to see if they're the kind found on Southwest. Say, Gunter, you're at the center of things here. Does Freckles seem odd to you?" Beri spoke intently, peering into Sirdey's eyes.

Sirdey took his time about answering. "The only thing that could be called odd, or strange in any way, is this mysterious killer agent. It *is* odd that we don't have a bet-



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ter line on it. Other than that, there's nothing unusual about the planet. And don't make anything of the killer," he added. "We don't have enough data yet on the meadow ecology to be able to pinpoint it. We couldn't normally expect to for months."

"Still, that poison must be very strange stuff, to hit before a trained Scout can notice the symptoms and signal for help," Beri rumbled. "Don't you have a sort of feeling there's more here than meets the eye?"

Sirdey looked at him for a long time. He had never had any such feeling about the planet. He was no Specialist, but as a Lieutenant of Scouts and later Team commander, he had had to have a good overall grasp of ecology. Furthermore, he had been married to a brilliant ecologist for many years and had absorbed a great deal more. His hunches were as reliable as anyone's.

He shook his head. "All planets are unique, of course," he said, "but we haven't seen anything strange here." By the time you've seen a dozen planets, the parallels outweigh the differences. He asked, "What makes you think so?"

Beri Cavour shook his big head. "Nothing positive. I picked up some impressions from Vixie Anthony and I discussed nerve poisons with Doc. He says he'd like to get his hands on the poison; it sounds very interesting to him." Sirdey had an uneasy feeling that he was missing something; mention of the poison had done that before. "Vixie Anthony was asking about spectro-surveys. She had one good idea, though: to build a deadman circuit into our utility bracelets so that we can reach the next victim before the poison breaks down. A good idea, but we don't have the sensors; there are over two hundred Team members. I get the idea that Vixie Anthony knows something we don't."

It was preposterous to think that anyone could know more about the planet than they. Before they had arrived, it had been discovered and surveyed by a ten-man scout from X Service. It had plotted the orbit, charted climate and weather patterns, determined the general range of proteins by spectro, and landed one man to take samples. It had taken a couple of months to mount this expedition, of course, but nobody could have learned much about Freckles in that time; it takes hundreds of men months of time to crack a planet.

They were interrupted by a mob of Scouts and Specs pouring into the Ops Room. Field dressings were common among them; there were arms in slings, and bruises and bloodstains everywhere. In the middle of the mob was Elly Chang, face flushed, shouting: ". . . But they've got to have cover! There'll be another along in a minute, but



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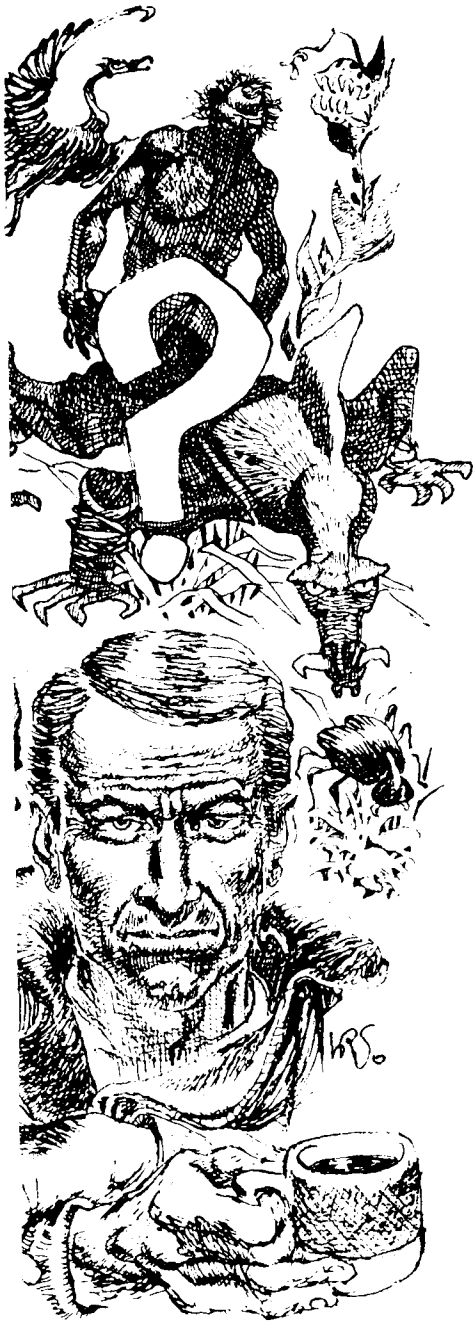

Team lives are more important—"

"Who denies it? But that's no excuse for destroying valuable specimens; he could've turned it . . ." Sana Sirdey, equally furious.

The Scouts and Specs separated into two silent, battered groups and Beri Cavour and Sirdey were treated to a fine verbal fight. He kept his face straight, but Beri openly rocked with laughter. Sirdey pieced events together from their words and the muttered explanations of the others.

It seemed that the two-ton swamp dweller had not been slowed much by the anesthetic. It got loose and was in among them before they could net it; that couldn't be done from the air without stampeding and maybe injuring it. They had a Scout flying cover—they had only the one aircar—but instead of diving on it and trying to turn it away, he had spun the car around and broken out the big double-barreled spray gun just inside the tail doors.

He saved several lives, including Sana's, but she and the other Specs were frothing because he had churned its insides to mush and they couldn't trace its wanderings. The spray guns were solenoidal projectile weapons, throwing a hundred tenth-inch soft-lead pellets per second from each yard-long barrel. The big base-mounted doubles had opposed gravitronic motors under the barrels to kill recoil.



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Vixie Anthony came in and shied at sight of the battle. He gestured her over and he and Beri explained it.

She peered at him. "You sound pleased by it," she accused.

Sirdey grinned faintly. "I am. There's no harm done, and this kind of fight is good for morale. They've been brooding too much lately. Now we should begin to see some progress."

The funeral for Keough and Simms had been held the day before. The autopsies, as expected, had told them nothing. The ashes were strewn in the memorial garden at Base. That usually caused an argument; some insisted that a man's ashes should be strewn around the cairn where he fell. This time there'd been no argument, a bad sign.

She nodded, enlightened. "Speaking of progress," she said after a moment, "Ralph Putnam is making some on the prairie. He says the alkalinity is essential; all of the plants and most of the bugs need it. It seems to be maintained by microbes protected by the plants, or something. He doesn't have all the details. It has to do with there being less duff and a lot of nitrogen-fixing plants."

Sirdey nodded. "Soils like that are common enough."

"I haven't had as good luck myself. I've been trying to eliminate possible killer agents, the way you mentioned," she said. Sirdey nodded in surprise. "I almost eliminated bugs and plants; there were no bugs in the tents, and none of the thorns or seeds in their clothing could have been it, according to Carnaby and Dr. Joubert. So it must be either a slow-acting poison, or something we've missed. There's something very strange here."

*Another one.* Her arguments had merit enough; those points had been made any number of times. Obviously it was something they'd missed.

Beri Cavour, whom he'd forgotten, leaned forward and stabbed a thick finger at her. "I've been a Scout myself," he rumbled, "and I know the kind of training they get. Rule out slow poison; there isn't any that doesn't have *some* symptoms."

The bandit blinked her startling eyes. "Then it must be something we've overlooked—something very strange."

"Not necessarily," Beri said mildly. "We have so little information we could look right at it and not notice it. It's our experience that the harder a thing is to find, the simpler and more common appearing it is. We're trained to look for strange things; anything unusual is apt to be dangerous. It has to be pretty common to have claimed so many victims, but with all our Scouts, not to mention the correlation robots, constantly looking for strange life forms, it would



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surely have been noticed after almost two months of the outposts."

"Well . . . if it's that common," began Vixie doubtfully.

Sirdey nodded. "Not as common as all that, but common enough. You notice that we had no casualties while we were still running sorties."

Sirdey's prediction of future progress came true the next morning. On returning from a tour of the labs, he found the Ops Room crowded with an excited multitude jostling close to the correlation robots. They made way for him, babbling excitedly, and at their center he found Carnaby, Sana, Kenya Argen, little Mayly Kara, and others who'd been on the forest ground-level ecology project. On the robots' readout visiplates were a series of ecological formulas flowing endlessly past.

"You were right, Gun!" exclaimed Sana. "We *were* oversimplifying our approach to the ecology. I had a feeling we were missing something all along—there it is."

"What is it?"

Carnaby answered. "We forgot that whether forest or meadow was replacing the other, they existed side by side and had done so for ages. That meant, if we'd stopped to think, that they were units of the overall ecology. What counts is the interrelationship between them. When we realized that, we had the key to both meadows and forest."

"What is the interrelationship?"

"Coexistence," said Sana. "It was Mayly who pointed it out." The shy little Spec smiled demurely. "You know how common creeping ground fire is here. If an area just happens to be burned off pretty intensively, say every year for, oh, a decade—you can figure the odds against that—the forest subecology will collapse. Fire increases the alkalinity of the soil, and all of the plants and animals depend on soil acidity at least indirectly. The bottom of the chain, as usual, is soil-eating bugs and worms, and they cannot eat alkaline soil; wrong kind of microbes in it. You get the idea?"

"How about the trees? Their deep roots should take them through it."

They shook their heads. "Those roots have to be aerated by the moles and soil-living bugs and worms. And the meadow bugs and worms can be disastrous, once the topsoil goes alkaline. It works out that forest changes over to meadow just fast enough to replace meadows swallowed up by the forest. A very small change is all it'd take to flip it over to one or the other. The colonists will have to be warned."

"How fast does the forest close the ring on the meadows?" someone asked over Sirdey's shoulder.

"About sixty feet per century. That's two tree diameters; one average lifetime of the trees. It's the



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[illegible] they drop their [illegible] [illegible] animal seen. But it takes a long time to breed the shadows out of [illegible] ecology."

"You have the forest subecology pretty well worked out," said Sirdey, watching the squirrels dive down the sniplane. Judging by the number of tube worms in there, the robots must be on [illegible] to provide approximation of [illegible] of known plants and animals to fill the niches.

Carnaby made room on one of the tables and spread out an ecological chart. "Adult trees seem to be independent of soil number; but seedlings can't root in alkaline soil. The colonists will have to mutate and adapt all their plants to one or the other or they'll upset the ecology and maybe turn the planet into a desert." That had happened.

The chart showed the negative half of an ecological cycle, with three spaces in the chain. On the right was half a page of biochemical equations, showing the "before" condition of the soil; in the first box, a question mark and the note, "trash-eating bugs & worms—no. unknown". The next box was occupied by the armored moles of the forest floor plus "other burrowers and surface eaters of box 1 occupants". Box three was also unknown, an unknown number of bugs, worms, and microbes that ate the waste products of the occupants of the first two boxes. There were other boxes, usu-

[illegible] [illegible] [illegible] [

the sun. They were only half their normal height halfway between the median and the ends.

"Very good," he said. "A very unusual effect; normally ecologies shade into each other. This is as abrupt as the shoreline, though in oceans a one-degree temperature difference frequently gives a similar effect."

"Catia Husak mentioned it and some of the rest of us noticed it," said Carnaby, "and maybe we should have investigated. But there are too many unimportant strange things on any planet; we couldn't know it'd turn out to be the key. These things have to be done systematically, solving one subecology at a time and fitting them together. We can't consider special cases until we've found what's normal for the planet."

"Don't worry about it; I've never seen a planet yet that couldn't have been penetrated sooner if the right tack had been taken," Sirdey told them. "This, with what Ralph has learned about the meadows, will give us a skeleton on which to hang the rest of it, as fast as we learn it. The robots will probably continue their correlations and deductions the rest of the day. It should soon be possible to have the meadow outposts manned again."

This first crack in Freckles' mottled mask disrupted work all over the planet. When the robots got their heads above the surface again, many lines of investigation would have to be opened to supply specific data; many present lines would have to be abandoned as being too general. The phase of general data-gathering was over now and they were ready for correlated research; they were over the first hump.

When Ralph called for help to find a missing ecological link in a strip of shoreside forest, almost everyone at Base responded; it was the best excuse for a party they could find. Sirdey, though aching for a chance to relax, himself, had to stay behind with the skeleton staff in case of emergencies.

Vixie Anthony had gone with them. Sirdey was a little surprised that the Scouts lieutenant would permit it. True, the young woman was a surprisingly good shot, but that does not qualify one for field duty on a frontier planet. Would she know when *not* to shoot? But Elly would look after her.

It seemed odd that an observer should have to be looked after, but Vixie had seemed odd from the beginning. She had been rushed aboard the ship just a couple of hours before they lifted off from Kelson. It was as if Vandine had heard of some lab or field technique of theirs just before they left and sent out an observer to see how it was used.

But no; Vixie had not taken any particular interest in their techniques; not the kind an observer would who'd been ordered to in-



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vestigate—just normal curiosity. Not that the Services cared; their techniques were not kept secret. But that was odd, now that he thought of it.

The only other reason for sending out an observer was to make sure that credit and material donated to the Services was not being wasted, but if that was her purpose here, she'd certainly have been interested in his northern ocean project. That had been expensive, though it would pay off yet.

She had got interested in this killer agent, of course. Before, though . . . wait a minute. She had found items that interested her. That dark horn some Team members had started carving in their spare time, those coarse dark furs from Southwest, the big nuts from broad-leafed trees, the aromatic sap of certain bushes on Northeast. Seashells, too.

That was just a waste of an observer's time. Those things were worthless. Though not necessarily worthless; furs and seashells and other plant and animal products, those are the things that may just turn out to be the most valuable to a Combine.

Not one planet in a dozen had a valuable bioproduct; most products were too common to be worth shipping. If this one did, it would be worth a fortune to a Combine to get an early lead on it. Though how anyone could have guessed there was anything here was more than he could say. They might have sent a ship on first reading X Service's report on the planet—but even then they must have found it by accident.

So far nothing she'd checked had panned out, but, if he'd known that she was looking for something valuable, he could have told her that the killer agent's poison was it. Such deadly, fast-acting poisons have many uses in medicine and biochemistry. This one should be even more useful than the widely-used RP-derivatives: ratepillar poison.

A strange, tantalizing feeling came over him at the thought. He traced it back, frowning. It was about poison, the killer agent, and Vixie Anthony. Finally he ran it down.

She seemed to be looking for something valuable here.

She was from an Independent Company; and Independents were known for their ruggedness.

This was an incredibly, unnaturally, deadly poison.

She had checked and found that the Penet Team was making no special effort to identify the killer agent, that it was relying on standard techniques—which were as likely as not to be ineffective, he added uneasily.

What kind of business would a Combine use an Independent for? Either something too small to handle—or too hot.



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That afternoon Gunter Sirdey stopped Langtry. When Sana took most of the personnel at Base to Northeast, the crews of the aircars servicing outposts in the meadows had had to be cut; Langtry was flying alone.

"Yes?" he asked. He looked at the Scout for several seconds. Langtry. Older than most Scouts; a five-year term as a Scout was required for all personnel, but most specialized and were promoted. Langtry had never studied any specialization, though he had lately taken an interest in zoology. Such unspecialized Scouts frequently became ecologists, the broadest specialty; some became Scout lieutenants, the most exacting specialty of all.

Langtry should have been holding down a station, taking over part of Jim's duties. He could be trusted. "I want," Sirdey said, "icons, mikes and half a dozen implant radio bugs from one of the outpost equipment lockers. I am," he added deliberately, "on the track of something that *may* be the killer agent, but I don't want to raise false hopes, so don't broadcast it."

Langtry looked back steadily, nodded. "Yes."

When the Chief Maintenance Officer was finally dragged exhausted to the visiphone that afternoon, he immediately began a tirade on the constant interruptions of the schedule; some of the outposts hadn't been serviced in two days. Sirdey cut through it.

"Could there be a ship here on the planet?" he demanded.

"A *ship?*"

"That's right, a hidden ship. Would it show on any of your instruments?"

"Why, it'd sound on the com as soon as they got in range," returned the other, mystified. "They'd call us first thing. Why'd they hide?"

"For any number of reasons, none of them pleasant," returned the Team commander crisply, not feeling like discussing it.

Beri Cavour stared at Sirdey, then he began to catch on; his eyes narrowed. "They'd have to be down on the surface, say near the south pole, with all gravitronic equipment off except little things like aircars. Maintaining com silence, of course. But if they were investigating the continents . . . looking for something, say . . ." He hesitated grimly. "I wouldn't waste time looking for the ship. The aircars would avoid our outposts." After a long moment of concentration, he grinned suddenly. "Your sensor-buoys! We'll mount gravito-inertial radiation detectors in them and lay them in the ocean between here and Southwest and the pole. There must be a lot of coming and going."

"That should do it," said Sirdey, relieved.

"Have it done in four, five



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days—and under the flower, too. Gun, tell me," he said seriously, "whatever could they be looking for? So far as I know there's nothing really valuable on the planet—just a few things that'd bring in a little credit. Has someone found *something too hot to tell the Team* about?"

Sirdey shook his head, equally puzzled. "As far as I know, there is no such thing. And there's nothing valuable here. It's just an ordinary planet; nothing at all unusual about it."

Team commander Sirdey was among the first notified; he got up out of his bed and reached the area near the medical dome by the time the medics completed their preliminaries. The group that Sana had taken to Northeast that morning had just returned and were milling *silently around the aircar out of* which came Beri Cavour, face gray, carrying one end of a stretcher.

Langtry, servicing the outposts, had been working alone. His robopilot had brought him in, someone said. Blood samples had already been taken and rushed into the lab, and the cold-eyed crowd was murmuring that perhaps this would solve the mystery.

One of Beri's talented assistants explained rapidly what little was known; luckily the robots were programmed to report the unusual. When nobody got out of the aircar, the pilot had notified the correlation robots who called a tech to fix the door-sensor switch.

Sirdey personally checked the aircar. He found the sensors he had asked for; he'd almost forgotten them. There was nothing else of *interest.*

The crowd made way for the Chief Medical Officer, Doc Joubert, back on his feet at last. He had been very nearly eviscerated by a carnivore; only regeneration had saved his life, and even now he was wearing a corset-like body cast. Vixie Anthony, face as pale as marble, supported him. Sirdey studied her face dispassionately.

"How long ago did it happen?" Doc asked.

"Not more than half an hour. At the last outpost; he had time to tell the pilot to bring him back to Base."

"This may crack it, then. Got to get right on it. Tell Arn I'm going ahead."

Sirdey took his other side and helped support him, taking the opportunity to activate one of the radio bugs and attach it to Vixie's shirt collar.

Returning to bed, he discussed it briefly with Sana, but neither felt like talking. No point in speculation anyway. But *could* this be the attack of a Combine? He had to consider the possibility. There were two questions: the valuable product Vandine was after; and the way the poison was administered.



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Presumably Vandine proposed to prevent penetration of the planet; if the Team could not identify the killer agent in the meadows, the Service would have to declare penetration incomplete and make up another Team. There were no rules, of course, restricting colonization of even unpenetrated planets, as in the old days. A corporation of colonists—or a Combine—could colonize without waiting for that second Team. There was no interstellar government; planets were too far apart. Even the Services had no administrative centers.

The giant Combines rarely colonized planets; it was too much of a risk and it took too long to pay off the investment. They made their profits by transporting the tens of millions of colonists and their giga-

The poison could be shrugged off if it was produced by the espionage division of Vandine. That would explain both its deadliness and the lack of pattern in the deaths. Sirdey had checked with the correlation robots late that afternoon, when they had completed the correlation of present data. Most of what they had already gathered had been woven into a web covering the planet. There was no place in any of it for such a poisonous native killer agent.

That was not conclusive; the



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ecological mode was not the only way of thinking about a planet. And if a poison did not affect native life, the ecological mode was all but worthless. There was still no evidence, but hunch insisted that the killer agents must be men.

Sirdey checked the time; it was nearly midnight. Before he could lie back down, the correlation robots called him again.

He had known that Vixie Anthony had joined the group of women who were sitting up with Langtry's fiancée. Now they reported that she had started back to her own quarters—and then that an unidentified person was at the door to her dome.

"Call Elly Chang and report to her!" he snapped, catching up his Service Special beamer.

At a run, changing to a trained Scout's indetectable advance, he made his way to Vixie Anthony's dome, approaching from behind. The correlation robots reported through his utility bracelet that the stranger had entered the dome but had not turned on the lights. There were no icons inside anyway. Vixie got there just before Gunter and Elly Chang, who came up behind him.

He had started around the front of the hut when he saw the open door and hesitated. Dim movement was visible; heavy breathing came from it. Before they could decide whether to advance or retreat, the dim opening was outlined in a bright, reflected flash; a soft crack accompanied it. A heavy weight collapsed to the floor.

They were at the door in an instant, long-barreled Specials ready. Sirdey turned on the lights. They revealed Vixie Anthony, hand to her mouth, bandit-stripe of freckles stark against her white features, wide red eyes staring at the huddled shape on the floor. In her other hand, tightly gripped, was a tiny hideout beamer.

She gasped with relief on seeing them and sank back into a chair, beginning to cry. Gunter Sirdey stalked forward, covering the huddled shape. His tension had given way to a vast, icy calm. Like a frozen man, he rolled the body over and looked.

The brown face of Beri Cavour was relaxed, almost peaceful in death. One black eye looked dully up at the glowing ceiling; the other had ceased to exist. Sirdey noted that, though the eyelashes were, of course, gone, the lids were untouched, and his estimation of the red-eyed bandit's competence rose sharply.

Near the body's outstretched hand was a tiny, sponge-bodied brush, wet with some clear, oily liquid.

"This will have to be settled tonight," Sirdey told them grimly an hour later. "The Team will have to be told in the morning. Doc,



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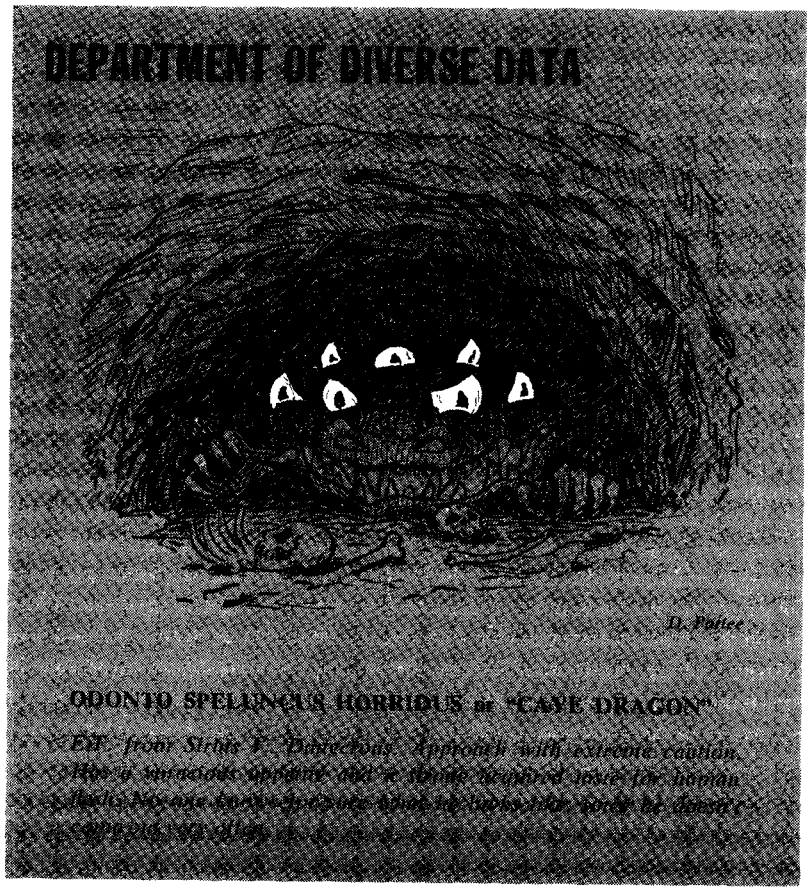
suppose you begin with the poison."

The Chief Medical Officer was exhausted and had a look of suffering, despite the painkillers. Beri Cavour had saved his life not two weeks before.

"I've never seen anything like it. It's a complex compound, neutral to the body. In this case, it was mixed with dernal, the common dermabsorptive agent; that carried it through the skin undetectably. It was carried to the liver, which oxidized it, but that gave a time-delay of twenty minutes to a quarter of an hour. Oxidation breaks it down into a number of unstable compounds, one of which happens to be a very deadly nerve poison. As



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we guessed, very minute quantities of it are fatal, and it breaks down rapidly. I knew industrial poisons were advanced, but never suspected anything like this," he added unhappily.

Sirdey grunted. Man was the most poisonous animal known; a Service truism with unexpected point.

"There's only one way he could have administered it," said Elly. "He smeared a drop on one sensor in each of several meadow outpost equipment lockers. It was highly problematical just when it would be touched, once the outposts were up, because new sensors are not set up every day. All those lockers must be checked tomorrow; a spectroanalyzer set for dernal would be the quickest. Dernal-proof gloves for those that're charged."

They all nodded. "I could shoot myself for not seeing the obvious sooner, even when I thought it was an outside job," Sirdey said. "I asked Langtry to bring in bugs from one of the outpost lockers because I didn't want anyone to know."

Vixie Anthony was under control again, though still pale. When he nodded at her, she said, "It's like you guessed. I was sent to check out the planet to see what there was on it that was so valuable to Darien Combine. Vandine had learned somehow that Freckles was important to them, that they had some big project on hand concerning it. I haven't had espionage training, but I'm the nearest they could get; I *have* had very good training in luxury products from frontier planets; that's Royal's main item of trade. Vandine doesn't maintain a sector base on Kelson like Darien and most of the others."

"You say you didn't find anything," prompted Elly.

"Check. I wasn't doing the actual field search anyway, just checking the things you turned up. With two-hundred-plus trained Penet men here, that was all that was necessary. You never found anything; and Darien couldn't have made a better search than you did. Ergo, there's nothing here."

"But there must be," insisted Sirdey. Sana and Doc nodded.

She shook her head. "If they didn't find a condition here promising a big profit, they must have been making one. I think Vandine suspected so all along; my job never seemed very important. You know an 'incompleted penetration' decision wouldn't prevent any group that wanted to from colonizing. This mysterious killer in the meadows doesn't sound so bad; not with the rest of the planet so well known. It's obviously not an integral part of the meadow ecology. I don't know their plans, of course, but I'd guess they intended to announce a colonization venture at the usual rates—transport, key industries, private equipment in



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quantities at the usual low rates—aircars, agrirobots, housing units, all the things colonists would need—and insurance for those who want to leave if the colony fails.

"Any other Combine that cared to could join, but none of them would dare offer insurance at the usual rate. You know that the Combines run very narrow margins in their colonizing ventures, under competition; their profits come through sheer quantity. Darien would take a lion's share of the trade, both selling goods needed for the colony and in transportation, because it's all part of the usual package. The colonists would have to buy from them to get their low insurance."

"That's a new one on me," said Sirdey, turning the idea over. It did fit better than anything he'd thought of. Sana was nodding, and Elly agreed after a moment.

"You can make up a lie detector," said the Independent emotionlessly. "I'll have to insist on being questioned. But that won't guarantee that what I'm saying is the truth; I don't know very much."

Most of Sirdey's suspicions were gone. Of course, it could have been Vandine as easily as Darien. He shrugged that aside; Svoba at Base on Kelson could handle that. "We'll have to question everyone, especially in the Maintenance Department, just to be sure," he agreed. "But we'll find no others. Bribing one man in a strategic place is all it took."

"By the way," said Sana to Vixie, "what was he doing down in your quarters?" She shook her head.

Sirdey smiled humorlessly. "I spooked him. He realized I was looking for a human killer agent, and it must've seemed like time to plant some evidence on someone else. There was only one suspect on the planet, after all—the only non-Team member here. He had a little packet of equipment with him. My guess was he intended to make it look like she had been preparing her poison and had accidentally got some on herself, then gone to bed and died. He couldn't have known she wouldn't be at home. Of course, that would have blown the plan and cost him his pay."

Vixie shuddered and Sirdey felt a sympathetic chill. "Ordinarily," he added soberly, "we find dangerous animals, or plants, on a planet when we arrive. That's no problem; nothing that gets in Man's way lasts long. But this time we brought one with us. Those are the most dangerous kind. Inside, there are hundreds of planets crawling with that kind. But there's no safety even on the frontier."

Beri Cavour had been a Penet man and a friend. ■



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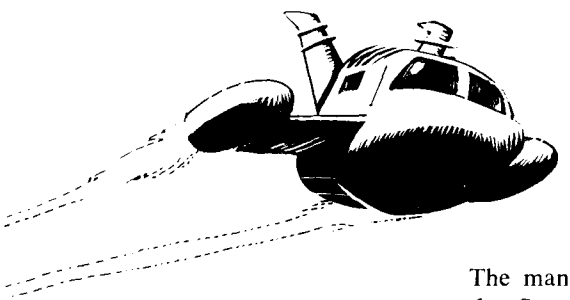
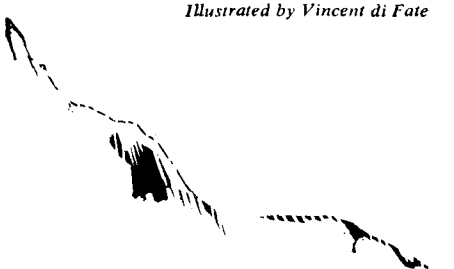


# The Busted Troubadour

*Among the people of a feudal culture, the troubadour is an always-welcome figure. It makes a fine cover for a visiting cultural anthropologist—so long as the cover stays on!*

**JACKSON BURROWS**

*Illustrated by Vincent di Fate*



The man who called himself Ken the Strummer looked up sharply from his shadowed corner. A giant stranger, huge and hulking under the low beams, had entered the crowded ale room.

Ken put down his tankard and plucked softly at the strings of the mandolin-like instrument slung from his shoulder. Sharp sweet notes cut through the clamor of the drinking men-at-arms.

"That's it, Ken! Give us a song! Quiet, everybody—Ken the Strummer's going to play!"

The cry echoed through the smoky chamber, and as Ken's fingers caressed the strings he adjusted one of the instrument's three pegs. A casual twist was all it took to send the emotion probe shooting out across the room toward the big stranger.

The reply bounced back to the little sensor embedded behind Ken's



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left ear. There was only black murder in the stranger's heart.

Ken sighed. So there was still plotting afoot, even on this, the eve of success. Wouldn't these people ever learn?

He built his song slowly, a haunting melody dating far back into legend, and he kept the notes low, forcing the room to silence if his music were to be heard.

The stranger pushed his way through the crowd to the long plank bar, shouldered aside two men, and bellowed for ale.

"Hey, there! Quiet! Ken the Strummer's playing!"

*Yes,* thought Ken. *I'm playing. And isn't this blessed inn ever going to run out of ale?*

The shout came from the far end of the bar, from a short stocky soldier with unruly yellow hair and flushed face. On the breast of his leather jerkin he wore the crest of the House of d'Anda, a stylized version of the pantherish creature that the men of this world called an angrit. On the jerkin under the crest were the two slash marks of the soldier's rank of six-leader.

The stranger wheeled to see who had ordered him to silence. Ken saw that the big man displayed no crest, and that his costume was the cheap papyri cloth of a peasant's garb.

That tore it. No crest on this night of all nights, and a peasant's appearance . . . but a manner that denied peasantry, and black murder in the heart. Ken had an assassin on his hands.

He wondered fleetingly why the man should show himself this openly. He was so obviously not what he seemed, and even had his disguise been better he surely knew that the Duke d'Anda would be well guarded, with an assassin's best chance lying in stealth . . .

The stranger plunged down the bar to confront the stocky six-leader. The shorter man held his ground, unintimidated by the other's size, conventional soldier's contempt for peasant clear in the twist of his lips.

*Something will have to be done about that contempt,* thought Ken. *But all things in good time.*

For an instant, as he played, Ken thought the stranger was actually going to offer battle to the six-leader. Ken considered trying a soother beam.

But then, as friends of the six-leader quietly ranged themselves at his side, the moment passed. The stranger snorted in disgust and stalked back across the ale room and out into the night.

Ken finished his song quickly and arose to leave.

"No, Ken! Stay! Give us another! There'll never be another night like this!"

Ken smiled haggardly, conveying weariness from the day's long march, and sought out the corridor that led to the stairs to the Duke's quarters on the second floor.



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Even without the assassin's arrival, there would have been no carousing celebration for Ken tonight. Too much depended upon the morrow's gathering with the King.

Ken nodded to the guards at the foot of the stairs and started up. Then he paused. Perhaps it would be a mistake to say anything to the volatile Duke d'Anda about the stranger. The word might be just enough to send him into a towering vengeful rage that could bring the whole operation tumbling down about the MCC's ears.

After all, at this stage of the game, with all the players finally in place for the last move, Ken's job was to see that the boat wasn't rocked.

But steps would have to be taken against the assassin—and the man who had sent him. Yes, most assuredly against the man who had sent him.

Ken turned and passed down the corridor, finding a door that issued out into the innyard.

Dying cook fires and flickering torches glowed in the night among the impedimenta of the Duke's soldiery, and Ken could see the gleam of drawn swords out along the perimeter where sentinels patrolled.

The assassin was nowhere to be seen. Again Ken adjusted the peg for the emotion probe, and a second peg for the soother beam. He strummed a note.

Officers and men-at-arms, camp followers and special details . . . all paused in the restless to-and-fro traffic of the yard, rapt faces turned toward the Duke's Troubadour.

There! Out beyond the farthest sentry, almost at the emotion probe's extreme range, Ken's sensor received deepest malice, not at all nullified by the soother beam.

So the assassin, for all his giant bulk and peasant's garb, had slipped in and out through the lines with ease. Now there was a trained man! And absolutely dedicated to his purpose. With growing unease, Ken wondered who he served.

And what was the assassin up to? First he showed himself openly . . . more than that, drew attention to himself . . . and now he skulked out there in the night, neither retreating nor advancing, just maintaining his position and projecting murder at the inn.

Ken found the captain of the Guard. "Better double the watch at the perimeter," he suggested. "We're not the only army converging on Cut Arm Creek tonight."

The officer bawled out orders. When Ken the Strummer, Troubadour and Confidant Prime to the Duke d'Anda, made a suggestion, that suggestion was a command.

Deeply disturbed, unable to fathom the assassin's actions, Ken returned to the inn. Perhaps he



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had better visit the Duke after all, just to reassure himself that all possible security measures had been taken.

The assassin must not reach the Duke. The MCC had deployed him as the major piece in the Cut Arm operation, and nothing must be permitted to change the course of events now. Besides, Ken had developed a liking for d'Anda, volatility, or no volatility.

Sudden alarm swept through Ken. Could it be that the assassin had already reached the Duke, had reached him *before* drawing attention to himself in the ale room? It wasn't likely, but it could explain his strange behavior. Risky though it might be, the stranger's behavior would be remembered and so throw suspicion upon him when the body was discovered. And that would make it absolutely clear that the murder had not been committed by one of the Duke's men, but by an outsider. And *that,* in turn, was apt to lead to angry accusations and pitched battle with the nearest army. And so the Cut Arm meeting would never come about.

If the Duke were already dead, the reason for the assassin's lurking out beyond the perimeter became clear. He was waiting for discovery of the body, and to report to his master if the desired reaction came about.

Ken raced up the stairs to the Duke's quarters, scarcely acknowledging the salutes of the guards.

The Duke was . . . safe.

He sat at table wolfing down dinner, a tankard in one hand, a steaming joint in the other. He waved the joint in greeting to Ken, inhaled lustily from the tankard. Foam slopped onto his grizzled beard and ran down his red neck.

"Ken! Been wondering where you were. Draw up a chair. Have a bite. Play me a tune."

The Duke's ruddy face glowed in the lamplight, and there was no denying the affection for Ken in his bright blue eyes.

Ken smiled easily and unlimbered his instrument. He played one and then another tune, but no matter how he adjusted the pegs he could detect no trace of the stranger's malice here. So he was still keeping his distance.

"Tomorrow!" exulted the Duke as Ken finished playing. "Tomorrow we pull the fangs!"

"And you're the man to whom goes the credit, my lord," Ken reminded.

D'Anda grinned hugely. He was not a boastful man, but neither was he overly modest.

"All I really had to do was convince that idiot Baron d'Ebro he'd better throw in with me—although I'll admit it took some pretty strong convincing. I do be-



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lieve he honestly thought I'd march against him. He should have had the wit to know that was the last thing in the world I wanted to do, no matter how I raged and stormed at him."

D'Anda paused to down another tankard of ale. His ruddy face grew ruddier. "Damn fool, that d'Ebro," he said, wiping the foam from his beard.

Ken started to speak, but d'Anda held up a restraining hand. "Damn fool I said, and damn fool I meant. So I scared d'Ebro into joining me. That adventuresome young d'Onna was already straining at the leash, and Count d'Iffi's a born conniver. All it took to bring them in was d'Ebro's declaration. Then old Duke d'Ulma fell in line . . . and *that* brought in the rest of them."

*Yes,* thought Ken, *and one of them's out to mess everything up. Or perhaps it's the King . . .*

D'Anda cast an appraising glance at Ken. "And I've not forgotten your part, Ken," he added.

"My part, my lord? I played no part."

Surely the Duke didn't suspect that . . .

"Yes, you rascal, your part!" The Duke slapped his meaty thigh heartily.

"I don't understand, my lord."

The Duke's eyes narrowed. "You really don't know the power of your music, do you, Ken? You really don't know how it quiets a man, and lets him think."

*The better to soothe your savage breast, my lord,* thought Ken wickedly, idly fingering the soother beam peg. *The better to drill some sense into your thick skull, my lord.*

Aloud, he said, "Why, thank you, my lord. I'm happy my playing has brought pleasure to you and your men."

"More than pleasure," amended the Duke. "Luck—you've brought us luck. Somehow, in the few months you've been with us, everything has gone right. Why, you weren't at the keep more than a week before I got the idea about Cut Arm Creek."

*You big likable savage,* thought Ken. *I planted that idea, and not very subtly, either, I'm afraid, and now you think of it as your own.*

Which, of course, was what it had been intended the Duke should think.

"It's a Troubadour's job to bring pleasure with his music," said Ken, "and to advise his lord in whatever small ways he can. If I've also brought luck, I'm grateful—but I suspect we all make our own luck. You've certainly made your own luck for the Cut Arm meeting."

The Duke nodded blind agreement and for a moment, slumped



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in his chair with the ravages of his heavy meal on the table before him, seemed to drowse.

Then his head snapped up. "Play me another tune, now, Ken, to settle my dinner and prepare me for bed. I swear, the thought of tomorrow has me edgy. Calm me, so that I may sleep, and so go forth at dawn clear of head and eye."

As Ken strummed he moved quietly about the chambers, reassuring himself that the windows were barred, that a dozen sentries kept watch below outside, *that not even the giant assassin* could get in.

He emotion-probed the Duke, but found nothing he did not expect to find. D'Anda was excited, yes, and thrilling with anticipation of the power he would wield in a few hours now. But that was all. There was no sign of suspicion, or of treachery.

*And that*, thought Ken proudly, *was quite an achievement indeed in this land of factional strife and distrust on every side.*

His mind swung back to the assassin. Ken was more certain than ever now that he was right in not apprising d'Anda of the man's presence. But it meant Ken must assume full responsibility for blocking him.

Ken finished strumming, took one final glance out the windows, and began drawing the heavy drapes across the bars.

"Leave 'em open," mumbled the Duke sleepily, waving a languid hand at the drapes. "It's a warm night."

"There's a mist rising from the meadows, my lord. You could catch a chill."

"My faithful Troubadour," murmured the Duke. "Watchful of me in even the smallest things. All right, Ken, draw the drapes. Then help me to bed."

But the Duke d'Anda was flat on his back on the bed, snoring, before Ken could even get his boots off. Ken left him in his stocking feet, one big toe protruding whitely through a hole in the rough hose.

*He probably won't bother to change in the morning*, thought Ken. *And so this world's brightest chapter to date in improving the human condition will be written by a man with a hole in his socks—and, no doubt, with dirty ankles besides.*

In the corridor outside Ken made one last precaution for the Duke's safety, arranging that a pair of bodyguards be stationed at d'Anda's bedside all night.

Earlier, before the appearance of the assassin, Ken had planned to spend the hours of darkness roving inn and camp, soother beam at the ready to deal with any threat to peace, be it drunken brawl or petty theft. Nothing must unsettle these soldiers and send them to Cut Arm spoiling for a fight.



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But now Ken would have to chance emotional disturbance. He drifted unobtrusively down the stairs and past the ale room toward the back of the inn. In a darkened entryway just beyond the kitchen he found an outside door, bolted now that full night had fallen.

He stepped back into the kitchen and crooked a finger at a serving maid. She joined him warily in the shadows.

Ken grinned. "It's not what you think, my dear, although I'll concede you have no right looking that pretty. I just want you to lock the door behind me."

She curtsied and Ken slipped the bolt and stepped out into the dark yard. He stood for a moment on the other side of the door, waiting until he heard the girl shoot back the bolt, and then he began prowling the night, emotion probe scanning, soother beam at the ready.

If he could get close enough to the assassin to give him a full jolt of the soother beam at point-blank range Ken's problem would be over. He could summon a guard and have the assassin bound up and locked away before he recovered from an extraordinary docility that he would never have known before. And before recovery, of course, Ken would have asked the questions that revealed whose man the giant was, although Ken thought he already knew.

The emotion probe showed the stranger had not moved since Ken had last detected him. He was still out there in front of the inn, beyond the sentry perimeter.

Ken faded back, keeping the inn between himself and the stranger, and when he reached the sentries on this side of the camp he let himself through their lines with a quiet word.

Ken often did this at night, in keep or camp, wandering out alone to pace star-flooded field and shaded wood. It contributed to his status as Troubadour; Duke and man alike assumed it was how he gleaned inspiration for song and wisdom.

And so it was. But in a way they never dreamed.

It would never do for Ken the Strummer to be overheard talking to himself, or, worse yet, to be heard in seeming conversation with beings that could be neither seen nor heard. To be caught thus engaged would place Ken one step beyond the acceptable and desirable mystic. It would shoot him straight into league with demons and witches. And no man would tolerate that; that would make his every word and deed suspect as the word and deed of evil.

And the way to destroy evil was to destroy evil's messenger.

Satisfied at last that he was out of earshot and sight, Ken emotion-probed one last time for the stranger. Still the man had not moved.



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Then, kneeling quickly, Ken turned off the probe and adjusted the third and last peg on his instrument. A carrier wave fanned out into space.

"Mission Control here," responded the silky feminine voice of the computer monitoring the radio in the MCC craft orbiting overhead. "Cleared to send message."

"Kennard here," said Ken softly. "Something's up. From all the evidence, I'd say I've spotted an assassin."

"Roger, Kennard. Stand by."

Impatiently, Ken waited while the computer summoned Graus, leader of this MCC mission. At last the sensor behind his ear came to life.

"Graus speaking," said the commander's gravelly voice. "What's this about an assassin?"

Ken brought Graus up to date. "Request permission to capture and query."

A pause. Graus was weighing the possibilities, balancing alternative against alternative . . . and all within the framework of the very short time remaining in which to take action.

"Attempting capture could be risky," Graus said.

"Not attempting to get information could be a lot riskier," Ken pointed out. "If the King's making one last desperate gambit . . ."

"I know," said Graus. "There could be assassins in all the encampments tonight."

"And," said Ken, "only one or two need be successful to wreck everything."

Graus made his decision. "All right. I agree there isn't time to be overly cautious. Take the man, and report back the minute you have him. Meantime, I'll see if I can't contact the other members of the team and alert them."

"Roger and out," said Ken, twisting the radio peg.

He turned his attention back to the stranger, circling widely, hoping to take him from the rear. He could see the big broad back now as the man hunkered down beside a bush, waiting, waiting . . .

Waiting for what?

Ken drew closer. When he was within feet of the man he wrenched the soother peg and dashed forward.

Too late. The giant had been playing possum. He uncoiled with the pent-up fury of a suddenly released spring. And even as the great fist slammed into the side of Ken's head and dropped him into spinning blackness, he finally understood the assassin's purpose.

The Duke d'Anda was not the man's target at all. The target was Ken. And he had permitted himself to be lured into this trap.

Ken awakened to a roaring headache, and it helped not at all that he was hanging head down over the giant's shoulder, his face banging into his captor's back with



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every trotting jounce. He made himself stay limp and try to collect his thoughts.

*So the King has discovered the Troubadour's role,* he decided. *And he's sent out monsters like this to every camp tonight, to take us captive and destroy our work.*

It bothered Ken that his judgment had been so poor, that he had let the stranger get him. This was no way to build the MCC's reputation, especially in the face of a galaxy that really preferred complete gadgetry when all was said and done.

No doubt the good and gracious King planned an unpleasant question-and-answer session with as many Troubadours as he could capture, and then death.

Well, Ken had no intention of letting everything go down the rocket tubes, here on Antares IV, or anywhere else. But first he had to deal with this big overgrown child who had slung him over his shoulder like a bag of meal and then set off with him on a trot through the woods. Ken supposed their destination was the King's keep near Cut Arm.

Ken's instrument hung by its cord from the giant's other shoulder. Carefully, lest the man sense movement in the legs he clasped to his chest, Ken reached across for the soother peg.

He wished his head would quit aching. He wished the peg on the bouncing instrument would quit eluding his fingers. But never mind. He'd have his answers before the King had his.

At last his hand closed on the peg. It was the work of an instant to adjust it.

The giant broke stride and stumbled as the full force of the soother beam hit him, and wild elation surged through Ken. But he was too quick in counting success. The giant relaxed as he lapsed into a docility that would have made a cud-chewing cow look like a fire-eating dragon, and in the relaxing he let go of Ken.

Ken pitched forward into the air, slammed into a tree, and sank to earth unconscious.

When he came to his senses his ribs ached as much as his head, and what he really wanted to do was curl up and have himself another little snooze. But he must question the giant. Already dawn's pale fingers were tendrilling in through the woods.

The giant lay before him, sprawled face down across the narrow path he had been following. Ken didn't like the look of the welt on his temple, but his breathing didn't sound too bad.

Ken nudged the supine form with a toe. The giant didn't budge.

"So you're as busted up as I am," Ken said with some satisfaction.

He leaned down and slapped the man's face, but there was no re-



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sponse. Ken guessed he would be unconscious for hours yet. He had probably struck his head on a stone as he stumbled and fell.

Ken's instrument was still strung from the other's shoulder. It looked undamaged, cushioned by the giant's body in the fall.

Ken recovered it and went through the stoppage drill with each of the three pegs. Soother beam, emotion probe, radio transmission . . . all functions responded.

Now to contact Mission Control, and find out what was up.

But even as Ken began to transmit, the giant, helpless and unconscious though he might be, rolled over and flung up an arm. The arm struck Ken's leg, unbalanced him, and, as he struggled desperately to juggle the instrument, sent him crashing to earth. He fell on the instrument.

At least he didn't get a peg through the chest. But he did get two very respectable whiplash burns from the snapping strings as well as one quite impressive splinter.

The instrument itself was almost demolished; bridge and sound board were crushed, flattened into a crude parody of what they had been, but all the pieces—except for the splinter—somehow still held together.

*There are some days when some people shouldn't get up.* Ken conceded. *Just as, on the other hand, there are some nights when other people—like me—very definitely should go to bed, and pull the covers up over their heads.*

He pulled out the splinter, cradled his head in his hands, and rubbed his ribs tenderly. Then, that seeming to be the limit of his first-aid resources, he hung the broken instrument from his shoulder and again went through the stoppage drill.

The emotion probe . . . functioned!

The soother beam . . . functioned!

The radio . . . did not function.

Ken fussed with the radio for ten minutes, trying to make repairs, but things were just too smashed up. And at least one microcircuit had vanished.

So he was on his own, and with no way of telling what, if anything, had happened to the other Troubadours.

But there *was* one thing he knew. It was past dawn, and the armies of this kingdom were even now converging on Cut Arm. What Ken must do was find out where in this world he was and then get to Cut Arm himself as fast as he could.

He nudged the sleeping giant again, but the man didn't stir.

"You probably don't know anything I haven't already guessed, anyway," Ken told the recumbent form. Then, in final derision: "Lout."



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Head throbbing with each step, ribs aching with each breath, blood seeping from the jagged splinter wound with each heartbeat, body burning more from string-lash with each stretch of skin, smashed instrument dangling at his side, Ken staggered on down the path in the direction the giant had been following.

It seemed the right way to go. If the giant had been taking him to the King, that would have meant delivery at the King's keep. And it was at the King's keep that Ken suspected he would find any other captured Troubadours.

For their sake, as well as that of the people of Antares IV, he hoped the King hadn't been able to capture many.

The path crossed a rocky stream, and halfway across Ken sat down on a rock and bathed himself. There, that felt better. He got up to go on, but unaccountably his feet slipped on the far bank and he fell heavily to the greensward.

He did not know how long he slept, but the sun was high when he awoke, and on top of his various aches and pains he was stiff in every joint.

*Whoosh*! he thought. *Was there ever such a busted Troubadour?*

He got to his feet gamely and set off down the path again. The sun warmed him now, and the sleep must have done him good, for he began to feel a little better.

Even so, as he topped a rise, he almost failed to see the battlements of the King's keep in the distance. He jerked his head up only at the sudden flurry of drums and trumpets drifting down the wind.

He saw the battlements, placed the direction from which the music came. He plunged ahead.

The path cut through the last of the woods and issued out onto the broad plain through which the creek called Cut Arm meandered.

Ken caught his breath at the sight which opened up before him.

There, on the far bank of the creek, pennons whipping in the breeze high above it, stood the enormous campaign tent of the King, the royal gold of its broad tapestried surface blinding in the sun. Flanking the tent rank on rank stood the King's cavalry, weapons drawn and glistening, and behind the cavalry the still and disciplined masses of the thousand foot soldiers.

But on this side of the creek . . . on this side stood the other half of the sight the Troubadours had labored for all these long months. There stood, side by side, coalesced into one massive display of unity, the legions of the nobility. Ken picked out the battle flags. D'Ebro, d'Onna, d'Iffi, d'Ulma . . . ah, there it was! . . . d'Anda's.

Ken stumbled through the ranks toward the flag, and when he reached it he was at the Duke d'Anda's tent. All the other nobles



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were there, mounted, ready to splash across Cut Arm Creek in a body to confront the King.

Ken had arrived in time. He would be here for the confrontation.

Consternation crossed d'Anda's face as he took in Ken's battered body and smashed instrument. He dismounted.

Baron d'Ebro's surly face darkened. "Hold, d'Anda! We haven't time for this Troubadour now. We're ready to ride!"

"But all the Troubadours vanished!" protested d'Anda. "That is, all save the King's. And now here's Ken, come from nowhere." Again he studied Ken's condition. "Ken, lad, what happened to you?"

*Would you believe I walked into a door?* thought Ken giddily, now quite close to exhaustion despite his earlier refreshment.

"My lord," he said, "I strolled in the night last night outside the camp, seeking inspiration." From somewhere Ken dredged up a blush. "I must have wandered farther than I realized, for when I turned to go back I was lost. I spent the night looking for my way . . . and tripped and fell a few times in the dark."

D'Ebro snorted disdain at such incompetence, and his horse skittered nervously. The other nobles looked restless.

*So all the Troubadours but the King's have vanished,* thought Ken. *At least he's still on the job. But with only two of us available, and unable to communicate with each other . . .*

Idly, he wondered why the King hadn't taken his own Troubadour captive, too. Surely, if he suspected the nature of the Troubadours and their role in this Cut Arm business, the first he would put out of action was his own.

"Come on," shouted d'Ebro to d'Anda. "We've got the King this far. Let's not keep him waiting. He can always change his mind, you know."

Ken nodded agreement. *No, let's not keep the King waiting. Not now.*

"I'll be all right, my lord," he told d'Anda. "The Baron d'Ebro's right. Don't worry about me now."

D'Anda paused a moment more, saw the wisdom in Ken's words, as he always did, and remounted. The little band pounded down the slope to the creek and splashed through to the other side, to come to a nervous halt before the King's tent, a very respectful halt despite its nervousness.

Ken could see the ranks of soldiery across Cut Arm stiffen in readiness, and he could sense the restless movement of the nobility's troops behind him.

All it would take now to turn Cut Arm Creek red with blood was one wrong word, one wrong move.

Ken, brushing aside the concerned d'Anda men-at-arms who clustered around him questioningly



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as the mounted party had ridden off, staggered down to the near bank of the creek.

D'Anda and the others had vanished inside the King's tent, but Ken was close enough to work his emotion probe.

Carefully, unobtrusively, he scanned, seeming only to fiddle with his instrument in assessment of its damage.

Normally, his job would have been only to keep d'Anda under control, and the job of Malcolm over there, serving as the King's Troubadour, would have been only to keep the King under control.

But now the two of them were responsibile for the whole blessed contingent of hotheads, and that kind of control was very precarious indeed.

Ken tried to remember the individual neural settings for each of the parties to the conference, fighting off his utter weariness and the wave of unconsciousness that threatened to engulf him with each passing minute. And there was the corollary worry that, incredibly, Malcolm might not have been contacted by the MCC after Ken's call, and so would not be scanning for anyone except the King.

But no, at least Ken didn't have that worry. Twice, as he shifted patterns, his probe encountered the one from Malcolm. So they were both at work, scanning, scanning . . . and each all the while at the ready with his soother beam.

The King, when Ken probed him, registered nothing so much as resentment and latent fear. Now that was odd. One would assume, if the King had divined the Troubadours' role and had had them spirited away, his primary registration would have been one of anticipation, of anticipation at how these nobles of his could so easily be diverted from their purpose, and so their petty jealousies and antagonisms stirred up by a judicious word or two. And that would be the end of the Cut Arm meeting.

Ken wondered if he could be reading the King right, or if he confused his neural pattern with someone else's.

Down the roster of adjustments he went, verifying, verifying . . .

And then the same black murder that had filled the assassin's heart swept out at him.

It came from Baron d'Ebro.

And Ken understood all.

D'Ebro, who had seemed so unwilling to join d'Anda's grand scheme, had not been unwilling at all. Had he not been the first to join?

But was he not also one of the last men in the world to place his head first upon the block? That, from d'Anda's viewpoint, had been implicit in d'Anda's summation of d'Ebro as a fool.

By fool, d'Anda meant a man who, unlike himself, couldn't see that the promise was great enough



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to dare all, and, even should the man see the promise, not have the wit to realize it could be brought safely to conclusion.

So d'Ebro, in final wavering decision, had set out to capture the Troubadours. Ken doubted that he actually had knowledge of MCC, or of the fact that these Troubadours came from off-world. His purpose would not have been to question them, but to get them out of the way. For he *did* have the sense to realize that events had started moving toward Cut Arm shortly after the Troubadours' arrival.

And d'Anda had called d'Iffi a born conniver! Ken was suddenly tired of the whole fractioned scheming society. No wonder it hadn't been getting anywhere but had bogged down in this feudal state of development.

He saw clearly what d'Ebro intended. If d'Ebro could immobilize the Troubadours, and then at the Cut Arm meeting, just as the King was about to put his signature to the parchment, suddenly tell the King to stay his hand because he, the loyal d'Ebro, was turning his back on this passel of traitors and pledging his men to the King's cause . . .

Why, then, in the face of superior strength, and without a Troubadour on hand to advise his lord, the whole business would fall apart and everything return to normal . . . with one exception. The exception was that d'Ebro would be the only noble who had the King's favor. And the kind of promise in that *was* the kind of promise d'Ebro could see.

Grimly, Ken locked onto d'Ebro and activated the soother beam. Not too strong, now. Not enough to make d'Ebro puzzle at what was happening. Just enough to calm him down and make him realize the game wasn't really worth the effort, that the course of least resistance was certainly to string along with d'Anda and the others.

Ken dared not the distraction of emotion-probing the others. Malcolm would have to watch them. If only the King didn't say something to touch off d'Anda's volatility . . .

Ken was close to collapse when the contingent of nobles finally left the King's tent, but he saw the parchment in d'Anda's hands and knew the MCC had won.

No. Not the MCC. This planet, this planet had won. In this place, this day, one small nation had produced a document that would change the course of history for all time, and bring yet another splintered segment of humanity back into the mainstream of civilization.

Now Malcolm would slip away from his newly-brooding King, and Ken would keep the soother beam on d'Ebro while he sought out d'Ebro's tent and released the other Troubadours.

As he guessed, they were all there, all nine of them, trussed up



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and under guard. Malcolm approached grinning across Cut Arm Creek, and Ken saw him finger his soother beam peg. The guards relaxed.

D'Anda waved the parchment triumphantly over his head as he and his companions swept back across Cut Arm Creek, and jubilation swept their camp. In the abrupt confusion the Troubadours headed for the rendezvous point.

Minutes later a shuttle picked them up, and they were safely on the way to the MCC mother ship.

Once more MCC had started a world back on the right track after it had forgotten its colony beginnings and slipped into near-barbarism, ignorant of the galactic civilization everywhere about it.

But one thing still gnawed at Ken. "I just wish we'd been able to do something about that contempt soldiers have for peasants," he told Malcolm.

"It won't last forever," Malcolm said. "Besides, the Federation can't afford to play nursemaid indefinitely to these planets that have lost their way. Simple economics forbids it."

Of course Malcolm was right. In every culture, even a galactic one, charity has its limits. And it was still true that he is helped best who helps himself. Well, the nobles of Antares IV had helped themselves today. Or so they thought.

Ken grinned happily. "So chalk up another one for the Magna Carta Corps," he told Malcolm. ■

## In Times to Come

*Next month is our December issue and we have a sort of Christmas present for you.*

*We don't ordinarily have our cover dominated by wild life, like blue jays and field mice, but Kelly Freas has done a beautiful job on a nesting blue jay. The nest is a little odd—a sort of computerized bird nest hash, so to speak.*

*The story is a lovely thing, too—"Ecological Niche," by Robert Chilson.*

*The men, who designed and built the totally automated self-repairing, self-maintaining ultra-city, designed a place that had no need of any living things other than humans.*

*But that didn't mean that living things had no need for a place. And by this time with three billion years experience in finding ways to live, love and multiply, they're somewhat better at it than engineers normally allow for.*

*It may turn out that actually it's not so much a question of "Can ecology survive automation?" as "Can automation survive ecology?"*

THE EDITOR.



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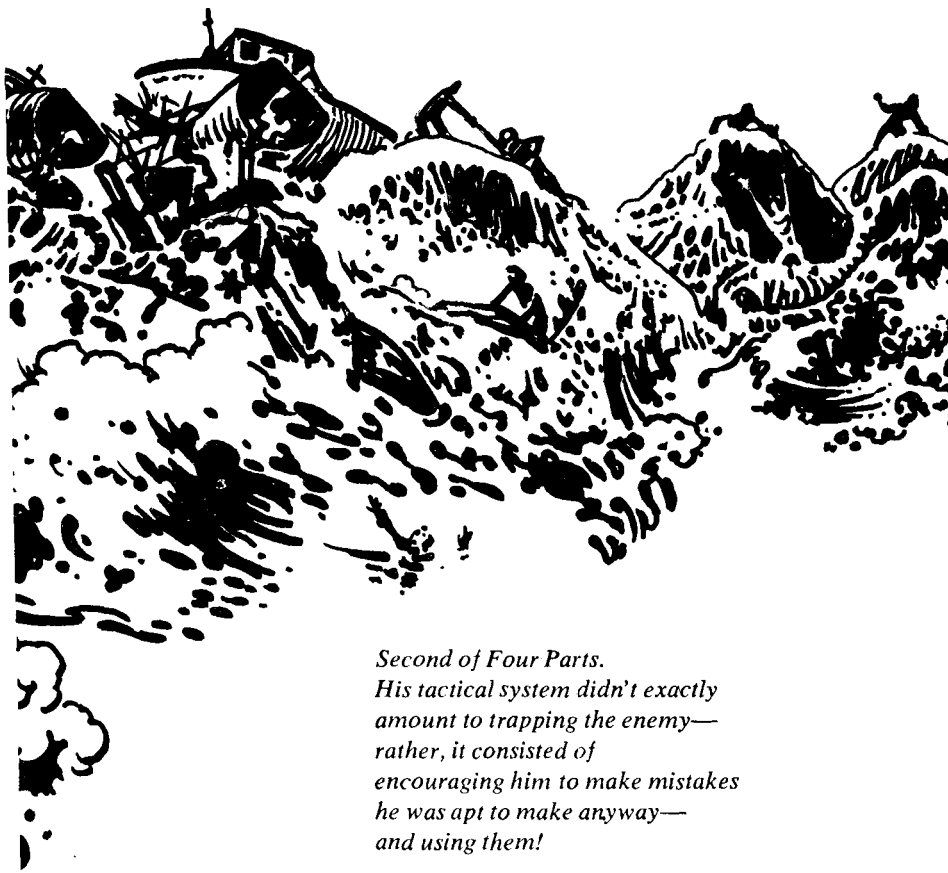
# THE TACTICS OF MISTAKE



*Second of Four Parts.*
*His tactical system didn't exactly amount to trapping the enemy—rather, it consisted of encouraging him to make mistakes he was apt to make anyway—and using them!*

**GORDON R. DICKSON**

*Illustrated by Kelly Freas*



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## SYNOPSIS

*"The young lieutenant colonel was drunk, apparently, and determined to rush upon disaster . . ."*

*The lieutenant colonel in question is Cletus Grahame, an officer in the Western Alliance, an aggregate of former Earth nations who dispute control of that world with the Coalition—another former nation group. The rivalry of the Alliance and the Coalition has mostly extended to colonized worlds off-Earth; with the two Earth political giants backing opposing sides in inter-colony wars.*

*The scene of Cletus's apparent drunkenness is the dining room lounge of a civilian spaceship en route to the colony world of Kultis where the Alliance has an expeditionary force helping the Exotic colony of Bakhalla against the Coalition backed Colony of Neuland. Cletus, limping on a half-prosthetic knee, sits down without invitation at the table of Dow de-Castries, Secretary to the Outworlds for the Coalition, also en route to Kultis.*

*At the table also are Eachan Khan, a full colonel in the Dorsai mercenaries, his daughter Melissa Khan, and an important Exotic named Mondar the Outbond, homeward bound to Bakhalla. Cletus reveals the fact that he was the former head of Tactics at the Alliance Academy. He initiates a duel of words with Dow and ends up engaging the Outworld secretary in a form of shell game with sugar cubes and coffee cups. Dow apparently wins, but his earlier attitude of cynical amusement at Cletus's actions suddenly changes. The secretary moves to stop and question Cletus—who is about to leave the table—and Melissa has to plead a headache to get Cletus away.*

*Outside the dining room, however, Melissa warns Cletus to stay away from Dow. Also, from herself and her father, whom a wild theorist like himself can only endanger. Sadly, Cletus agrees.*

*Several days later, however, as they are driving into Bakhalla from the spaceport landing area, the military vehicle in which Cletus, Eachan, Mondar and Melissa are riding, is attacked by guerrillas. They are about to be overrun and killed when Cletus—who has played dead and got control of their dead driver's weapon—wipes out the guerrillas as they make their final charge. Melissa is shocked by the grim, combat-readiness she observes in Cletus.*

*In Bakhalla, Cletus encounters General "Bat" Traynor, his commanding officer, who had requisitioned jungle-breaker tanks and is unhappy to have been sent a tactical adviser, in Cletus, instead. Bat seizes upon Cletus's prediction that a new influx of Neulander guerrillas will be infiltrating the upcountry, soon; and agrees to send Cletus to help capture them—but*



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*with too few men and a very junior field officer who, however, under combat conditions will outrank Cletus. Clearly he is hoping Cletus will make a mess of things so that he can be sent back to Earth that much sooner.*

*That evening Cletus attends a party at Mondar's, where he once more encounters Dow deCastries, and under the cloak of polite words the two men acknowledge their basic enmity. Later, alone with Mondar, Cletus experiences an unreal scene in which he and Mondar are each only one in a line of figures, stretching before and behind each man. The figures behind Cletus include a man with only one arm and end in a powerful old man in Fourteenth Century Italian armor, carrying a military commander's baton.*

*Mondar pleads with Cletus to join the Exotics and develop his obvious unusual mental and physical powers. Cletus refuses.*

*The next day he leaves with the troops to capture the guerrillas. In command is a sullen, hypersensitive first lieutenant named Bill Athyer. Cletus, playing on the lieutenant's impulsiveness, talks him into taking most of the troops to guard a couple of river crossings, while Cletus himself, with only seven men, guards three others. Then, by using his men well, and making use of some equipment he has specially requisitioned, Cletus meets and captures half the infiltrating guerrillas with only seven men, managing to turn the other half back toward Athyer's superior forces.*

*In the process, however, he further damages his half-artificial knee joint. Sitting on a boulder he rips up his pants leg and gives the swollen knee a shot of narcothesia.*

*Cletus leans back and lets the narco-anesthetic fold him into unconsciousness. Then darkness claims him.*

## Part 2

### IX

Lying on his back in the hospital bed, Cletus gazed thoughtfully at the stiff, sunlit form of his left leg, upheld in traction above the surface of the bed.

". . . So," the Duty Medical Officer, a brisk, round-faced, fortyish major had said with a fiendish chuckle when Cletus had been brought in, "you're the type that hates to take time out to give your body a chance to heal, are you, Colonel?" The next thing Cletus had known he was in the bed with his leg balanced immovably in a float cast, anchored to the ceiling.

"But it's been three days now," Cletus remarked to Arvid, who had just arrived, bringing, as per orders, a local almanac, "and he promised that the third day he'd turn me loose. Take another look out in the corridor and see if he's been in any of the other rooms along here."



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Arvid obeyed. He returned in a minute or two, shaking his head.

"No luck," he said. "But General Traynor's on his way over, sir. The nurse on the desk said his office just phoned to see if you were still here."

"Oh?" said Cletus. "That is right. He'd be coming, of course." He reached out and pressed the button that tilted the bed to lift him up into a sitting position. "Tell you what, Arv. Take a look up and down the other rooms for me and see if you can scrounge me some spacepost covers."

"Spacepost covers?" replied Arvid, calmly unquestioningly. "Right, I'll be back in a minute."

He went out. It took him more like three minutes than one; but at the end of that time when he returned he had five of the flimsy yellow envelopes in which mail sent by spaceship was ordinarily carried. The Earth Terminal postmark was square and black on the back of each. Cletus stacked them loosely together and laid them in a face-down pile on the table surface of his bedside console. Arvid watched him.

"Did you find what you wanted in the almanac, sir?" he asked.

"Yes," said Cletus. Seeing Arvid still gazing at him curiously, he added, "There's a new moon tonight."

"Oh," said Arvid.

"Yes. Now, when the general comes, Arv," Cletus said, "stay out in the corridor and keep your eyes open. I don't want that doctor slipping past me just because a general's talking to me; and leaving me hung up here for another day. What time was that appointment of mine with the officer from the Security Echeon?"

"Eleven hundred hours," said Arvid.

"And it's nine-thirty, already," said Cletus, looking at his watch. "Arv, if you'll step into the bathroom there, its window should give you a view of the drive in front of the hospital. If the general's coming by ground car, you ought to be able to see him pulling up about now. Take a look for me, will you?"

Arvid obediently disappeared into the small bath cubicle attached to Cletus's hospital room.

"No sign, sir," his voice came back.

"Keep watching," Cletus said.

Cletus relaxed against the upright slope of the bed behind him, half-closing his eyes. He had been expecting the general—in fact, Bat would be merely the last in a long line of visitors, who had included Mondar, Eachan Khan, Melissa, Wefer Linet—and even Ed Jarnki, himself. The gangling young noncommissioned officer had come in to show Cletus the new sergeant's stripes on his sleeve and give Cletus the credit for the fact they were there.

"Lieutenant Athyer's report tried



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to take all the credit for himself," Jarnki said. "We heard about it from the company clerk. But the rest of the squad and me—we spread the real story around. Maybe over at the Officers Club they don't know how it was; but they do back in the barracks."

"Thank you," said Cletus.

"Hell!" said Jarnki, and paused, apparently at somewhat of a loss to further express his feelings. He changed the subject. "You wouldn't be able to use me yourself, would you, Colonel? I haven't been to clerks' school; but I mean—you couldn't use a driver, or anything?"

Cletus smiled.

"I'd like to have you, Ed," he said, "but I don't think they'd give you up. After all, you're a line soldier."

"I guess not, then," said Jarnki, disappointed. He went off, but not before he extracted from Cletus a promise to take him on, if he ever should be needed.

Jarnki had been wrong, however, in believing that Athyer's report would be accepted at face value among the commissioned ranks. Clearly, the lieutenant was known to his fellow officers for the kind of field commander he was. Just as it had been fairly obvious that Bat had not chosen an officer like him by chance to test Cletus's prophecy of guerrilla infiltration. As Arvid had reported to him, after that night at Mondar's party, the word was that Bat Traynor was out to get Cletus. In itself, this information had originally meant merely then that Cletus would be a good person for his fellow officers to avoid. But now, since he had pulled his chestnut out of the fire up on the Blue River without burning his fingers, there was plainly a good deal of covert sympathy for him among all but Bat's closest supporters. Eachan Khan had dryly hinted as much. Wefer Linet, from his safe perch inside the Navy chain of command, had blandly alluded to it. Bat could hardly be unaware of this reaction among the officers and men he commanded. Moreover, he was a conscientious commanding officer in the formal sense. If anything, it was surprising that he had not come to pay a visit to Cletus at the hospital before this.

Cletus relaxed, pushing back the tension in his body that threatened to possess it in impatience at being anchored here on the bed when so many things were yet to be done.

The sound of the door opening brought his eyes open as well. He raised his head and looked to his right in time to see Bat Traynor entering the hospital room. There had been no warning from Arvid, still in the bathroom. Fleetingly, Cletus permitted himself the hope that the young lieutenant would have the sense to stay out of sight, now that his chance to discreetly leave the hospital room was barred.



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Bat strode up to the edge of the bed and stared down at Cletus, his expressive eyebrows drawing together in a faint scowl.

"Well, Colonel!" he said, as he pulled a nearby chair close to the bed, and sat down so that he stared into Cletus's face on a level. He smiled, in hard, genial fashion. "Still got you tied up, I see."

"I'm supposed to be turned loose today," Cletus answered. "Thank you for dropping by, sir."

"I usually drop by to see one of my officers who's in the hospital," said Bat. "Nothing special in your case. Though you did do a good job with those men up on the Blue River, Colonel."

"The guerrillas weren't very eager to make a fight of it, sir," said Cletus. "And then I was lucky enough to have them do just what I'd guessed they'd do. The general knows how unusual it is when everything works out in the field just the way it's planned."

"I do. Believe me, I do," answered Bat. Under the heavy brows, his eyes were hard, but wary, upon Cletus. "But that doesn't alter the fact that you were right in your guess about where they'd come through and what they'd do, once they were through."

"Yes, I'm happy about that," said Cletus. He smiled. "As I told the general, I pretty much bet my reputation on it to my friends back on Earth just before I left."

He glanced, as if unthinkingly, at the loose pile of face-down spaceship covers. Bat's eyes, following the direction of Cletus's gaze, narrowed slightly at sight of the yellow envelopes.

"You've been getting congratulations, have you?" Bat asked.

"There's been a few pats on the back," Cletus confessed. He did not add that these had been only from such local people as Eachan, Mondar, and newly-made Sergeant Ed Jarnki. Instead, he continued gently on a slight change of subject. "Of course, the operation wasn't a total success. I heard the rest of the guerrillas managed to get back through the pass before Lieutenant Athyer could contain them."

Bat's eyebrows jerked together into a solid angry line of black.

"Don't push me, Colonel!" he rumbled. "Athyer's report said he got word from you too late to take his men up into position to bar the pass."

"Was that it, sir?" said Cletus. "I'd guess it was my fault, then. After all, Athyer's an experienced field officer and I'm just a desk-jockey theoretician. I'm sure everybody realizes it was just luck that the contact my squad had with the enemy was successful and the contact the lieutenant and the rest of his company had, wasn't."

"Of course," said Bat, grimly. "And if they don't understand it, I do. And that's what's important—isn't it, Colonel?"



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"As you say, sir, that's what's important," said Cletus.

Bat sat back in his chair, and his brows relaxed.

"Anyway," he said, "I didn't come here just to congratulate you. A suggestion by you came through to my office that you set up a staff to make regular weekly forecasts of enemy activity. There was also your request for personnel and office space to facilitate your making such forecasts. Understand, Colonel, as far as I'm concerned, I still need you like I need a fifty-man string ensemble. But your success with the guerrillas has got us some good publicity back at Alliance HQ; and I don't see how you can do any harm to the rest of the war effort here on Kultis by setting up this forecast staff. So, I'm going to approve it." He paused, then shot the words at Cletus. "That make you happy?"

"Yes, sir," said Cletus. "Thank you, General."

"Don't bother," said Bat, grimly. "As for Athyer—he had his chance, and he fell on his face. He'll be coming up for a Board of Inquiry into his fitness as an Alliance officer. Now—anything else you want?"

"No," said Cletus.

Bat stood up abruptly.

"Good," he said. "I don't like having my arm twisted. I prefer handing out favors before they're asked. Also, I still need those tanks; and you're still going back to Earth at the first opportunity, Colonel. Tuck that fact into your prognostications and don't forget it!"

He turned on his heel and went toward the door.

"General," said Cletus. "There is a favor you could do me . . ."

Bat checked and swung about. His face darkened.

"After all?" His voice was hard. "What is it, Colonel?"

"The Exotics have quite a library here in Bakhalla," said Cletus. "With a good deal of military text and information in it."

"What about it?"

"If the general will pardon me," said Cletus, slowly, "Lieutenant Athyer's main problems are too much imagination coupled with not enough confidence in himself. If he could get away and season himself for a while—say, as Information Officer for the Expeditionary Forces, to that Exotic library—he might turn out highly useful, after all."

Bat stared at Cletus.

"Now why," said Bat softly, "would you want something like that for Athyer, instead of a Board of Inquiry?"

"I don't like to see a valuable man wasted," said Cletus.

Bat grunted. He turned on his heel and went out without a further word. Looking a little sheepish, Arvid emerged from the bathroom.

"I'm sorry, sir," he said to Cletus. "The general must've come



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by air and landed on the roof."

"Think nothing of it, Arv," said Cletus, happily. "Just get out in that corridor and find me that doctor. I've got to get out of here."

Twenty minutes later, Arvid having finally located and produced the medical officer, Cletus was finally out of his cast and on his way to the office space Arvid had located for him. It was one of a set of three office suites, each one consisting of three rooms and a bath, that had originally been erected by the Exotics for housing VIP guests. The other two suites were empty, so that in essence, they had the building to themselves—a point Cletus had stipulated earlier when he had sent Arvid out to search. When they reached the office, Cletus found it furnished only with some camp chairs and a temporary field desk. A lean major in his early forties with a white scar across his chin was examining these in disparaging fashion.

"Major Wilson?" asked Cletus, as the officer turned to face them. "I'm Colonel Grahame."

They shook hands.

"Security sent me over," Wilson said. "You said you were expecting some special problem, here, Colonel?"

"I'm hoping for one," replied Cletus. "We're going to be handling a good deal of material here, from the Classified category on up. I'm going to be making weekly forecasts of enemy activity for the general. Sooner or later, the Neulanders are bound to hear of this and take an interest in this office. I'd like to set it up as a trap for anyone they send to investigate."

"Trap, sir?" echoed Wilson, puzzled.

"That's right," said Cletus, cheerfully. "I want to make it possible for them to get in; but, once in, impossible for them to get back out again."

He turned to indicate the walls around them.

"For example," he said, pointing, "heavy steel mesh on the inside of the windows, but anchored so that it can't be pried loose or cut through with ordinary tools. An obvious lock on the outer door that can be easily picked—but a hidden lock that fastens the door securely, once the open lock has been picked and the door opened and shut once. Metal framing and center panel for the door frame and door itself; so that they can't break out once the hidden lock has closed the door. Possibly a wiring system to electrify the door, windows, and ventilator system just to discourage any attempt to break loose."

Wilson nodded slowly, but doubtfully.

"That's going to add up to a good bit in the way of work-time and materials," he said. "I suppose you have authorization for this, Colonel . . . ?"

"It'll be forthcoming," said



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Cletus. "But the thing is, for your division to get to work on this right away. The general was just talking to me less than an hour ago in the hospital about getting this office set up."

"The general . . . oh!" said Wilson, becoming brisk. "Of course, sir."

"Good, then," said Cletus. "That's settled."

After discussion of a few details, and after Wilson had taken a few measurements, the Security Officer left. Cletus set Arvid to getting Eachan Khan on the field telephone, that with the table and chairs was the office's only current equipment. The Dorsai colonel was finally located out in the training area set aside for his mercenary troops.

"Mind if I come out?" asked Cletus.

"Not at all." In the small vision screen of the field phone Eachan's face looked faintly curious. "You're welcome anytime, Colonel. Come along."

"Right," said Cletus. "I'll be there in half an hour."

He broke the connection; and, leaving Arvid to see about getting the office supplied with furniture and staff, Cletus went out and took the staff car in which Arvid had driven him here to the training area of the Dorsai troops.

He found Eachan Khan standing at the edge of a field with a ten-meter metal tower in its center, from which what looked like a company of the tanned Dorsai professionals were practicing jump-belt landings. The line of those waiting their turn stretched out patiently behind the tower, from the top of which mercenaries were going off, one by one, the shoulder jets of the jump belts roaring briefly and kicking up a cloud of whitish-brown dust as each one fell Earthward. For men not exclusively trained as jump troops, Cletus noted with satisfaction as he limped up to the watching Eachan Khan, there were a great many more soft, upright landings than might have been expected.

"There you are," said Eachan, without turning his head, as Cletus came up behind him. The Dorsai colonel was standing with his legs slightly spread, his hands clasped behind him as he watched. "What do you think of our level of jump training, now you see it?"

"I'm impressed," answered Cletus. "What do you know about guerrilla traffic on the Bakhalla River?"

"Fair amount. Bound to be, of course, with the river running right through the city into the harbor, here." Eachan Khan stared at him, curiously. "Not so much infiltrators as sabotage materials, I understand, though. Why?"

"There's a new moon tonight," explained Cletus.

"Eh?" Eachan stared at him.

"According to the local tide tables," said Cletus, "that gives us an



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unusually high tide—all the little tributaries and canals will be running deeper than usual as much as twenty miles inland. A good time for the Neulanders to smuggle in either large amounts of supplies, or unusually heavy equipment."

"Hm-m-m . . ." Eachan fondled the right tip of his moustache. "Still . . . if you don't mind a word of advice?"

"Go right ahead," said Cletus.

"I don't think there'd be anything you could do about it," said Eachan. "River Security is maintained by a half-dozen army amphibs with half a dozen soldiers and light weapons on each one. That's not enough to do any good at all, and everybody knows it. But your General Traynor opts for land war equipment. About six months back he got five armored personnel carriers by swearing to your Alliance HQ that his river defenses were perfectly adequate and that instead of sending him a couple of patrol boats, they could give him the personnel carriers, instead. So, if you go pointing out probable trouble on the river, you're not going to be making Traynor very happy. My advice would be—let any Neulander activity there go by on your blind side."

"Maybe you're right," said Cletus. "How about lunch?"

They left the training ground and drove in to the Officers Club for lunch, where Melissa joined them in response to a telephone call from her father, at Cletus's suggestion. Melissa was somewhat reserved over the lunch table and did not often meet Cletus's eye. She had come with her father for one brief visit to Cletus in the hospital, during which she stood back and let Eachan do most of the talking. She seemed inclined to let him do most of the talking, now; although she glanced at Cletus from time to time when his attention was on her father. Cletus, however, ignored her reactions and kept up a steady, cheerful flow of conversation.

". . . Wefer Linet's been after me," Cletus said, to her, when they finally reached the coffee and dessert stage, "to take one of his underwater tours in one of the Mark V submarine dozers. How about joining me for that with him this evening; and we can come back into Bakhalla afterwards for a late supper?"

Melissa hesitated; but Eachan broke in, almost hastily.

"Good idea, girl," he said, almost gruffly. "Why don't you do that? Do you good to get out for a change."

The tone of Eachan's voice made his words sound like a command. But the naked voice of appeal could be heard beneath the brusqueness of the words. Melissa surrendered.

"Thank you," she said, raising her eyes finally across the table to meet Cletus's, "that sounds like fun."



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## X

Stars were beginning to fill the Bakhallan sky as Cletus and Melissa reached the gates to the Navy Yard and were met by an ensign attached to Wefer Linet's staff. The ensign conducted them inside to the ramp where the massive, black two-story-tall shape of a Mark V squatted on its treads just above the golden-tinged waters of the Bakhallan harbor. Cletus had phoned Wefer immediately on parting from Eachan and Melissa after lunch, to set up the evening's excursion.

Wefer had been enthusiastic. Navy regulations, he gleefully informed Cletus, absolutely forbade his allowing a civilian like Melissa aboard a duty navy vehicle like the Mark V. But personally, he, Wefer, did not give a damn. For the record, he had only caught the words "Dorsai" and "Khan" when Cletus had phoned him earlier—and who, of course, could those words apply to but to a mercenary colonel of his acquaintance, who was certainly no civilian? So he would be waiting for Colonel Grahame and Colonel Khan aboard the Mark V at seven p.m. that evening.

Awaiting them he was. Moreover, he seemed to have shared the joke of his little deception of navy regulations with his under-officers and crew. The ensign meeting Cletus and Melissa at the Navy Yard gate had gravely addressed Melissa as "Colonel"; and they were hardly aboard the Mark V before three of the seamen, grinning broadly, had found occasion to do the same.

This small and ridiculous joke, however, turned out to be just the straw needed to break the back of Melissa's stiffness and reserve. On the fourth occasion of being addressed as "Colonel," she laughed out loud—and began from then on to take an honest interest in the outing.

"Any place in particular you'd like to see?" asked Wefer, as the Mark V put itself into motion and rumbled slowly down its ramp into the bay.

"Up the river," said Cletus.

"Make it so, Ensign."

"Aye, aye, sir," said the ensign who had met them at the gate. "Balance all tanks fore and aft, there!"

He was standing at the con, a little to the left of Wefer. Cletus and Melissa were placed before the large, curved shape of the hemispherical screen that looked through the muddy water ahead and about them as if it were clear as glass, to pick up the shapes of ships' undersides and other solid objects below water level in the harbor.

There was a faint hissing and rumbling noise all around them. The vibration and sound of the heavy treads on the ramp suddenly



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ceased, and the waterline, shown on the hemispherical screen, moved up above the horizon mark, as the huge vehicle balanced out its ballast, replacing water with compressed air where necessary, and vice versa, so that the submarine dozer—its hundreds of tons of land weight now brought into near-balance with an equal volume of water—floated as lightly as a leaf in air, down to the muddy bottom of the harbor, sixty feet below.

"All forward, right thirty degrees horizontal," ordered the ensign; and they began their underwater tour upriver from Bakhalla.

"You'll notice," said Wefer in the fond tone of a father pointing out the talents of his first newborn, "our treads aren't touching the bottom, here. There's nearly ten feet of loose silt and muck underneath us before we hit anything solid enough for the Mark V to walk on. Of course, we could settle down into it and do just that, if we wanted to. But why bother? We're as much at home and a lot more mobile by staying up in the water itself and simply swimming with the treads. Now look there—"

He pointed to the screen, where, some two hundred yards ahead of them, the bottom dipped abruptly below their level of sight for a space of perhaps fifty yards before it rose again.

"That's the main channel—the main current line to the sea," Wefer said. "We clean that out daily—not because there are any ships here with draft enough to need a hundred and ten feet of water under them; but because that trench provides a channel for the current that helps keep the harbor from silting up. Half of our work's understanding and using existing patterns of water movement. By keeping that channel deep, we cut our normal silt-removal work in half. Not that we need to. It's just the navy way to do it as efficiently as possible."

"You mean you've got enough Mark Vs and crews to keep the harbor clear even if the channel weren't there?" Cletus asked.

Wefer snorted good-humoredly.

"Got enough—" he echoed. "You don't know what these Mark Vs can do. Why I could keep the harbor clean, even without the current channel, with this one machine alone! Let me show you around here."

He took Cletus and Melissa on a tour of the Mark V,s interior from the diver's escape chamber down between the massive treads to the arms turret at the top of the vehicle, which could be uncovered to allow the Mark V to fire either its two heavy energy rifles or the underwater laser with which it was provided.

". . . You see why Traynor wanted these Mark Vs for use in the jungle," concluded Wefer, as they ended their tour back in the control room before the hemisphe-



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rical screen. "It hasn't got the fire power of the army's jungle-breaker tanks; but in every other respect, except land speed, it's so far superior that there's no comparison—"

"Sir," interrupted the ensign behind him, "deep-draft surface vessel coming down the channel. We're going to have to get down and walk."

"Right. Make it so, Ensign," answered Wefer. He turned to the screen and pointed at the v-shaped object cutting the line of the river surface some two hundred yards ahead of them. "See that, Cletus? Melissa? It's a boat drawing nine or ten feet of water. The channel here's less than fifty feet deep and we're going to have to get right down on the bottom to make sure that boat goes over with a good couple of fathoms of clearance."

He squinted at the v-shape growing on the screen. Suddenly, he laughed.

"Thought so!" he said. "That's one of your river patrol boats, Cletus. Want to have a look at its topside?"

"You mean, with a sensor float?" asked Cletus, quietly.

"How'd you know about that?" Wefer demanded, staring.

"There was an article about it in the *Navy-Marine Journal*, a little less than two years ago," answered Cletus. "It struck me as the sort of device a sensible navy would put aboard a vehicle like this."

Wefer still stared at him, almost accusingly.

"Is that so?" Wefer said. "What else about the Mark V do you know that I don't know you know?"

"I know that with a bit of luck you might be able to capture a boatload of Neulander saboteurs and supplies bound for Bakhalla tonight, if you want to try for it. Have you got a map of the river?"

"A map?" Wefer lit up. He leaned forward and punched buttons below the hemispherical screen. The view on it vanished, to be replaced by a representation of a map showing the main river channel with its tributaries from the harbor mouth at Bakhalla to some thirty miles upstream. A barely-moving red dot in the shape of a Mark V, seen from above, was crawling up the main channel in representation of the vehicle enclosing them. "What guerrillas? Where?"

"About six kilometers upstream from here," Cletus answered. He reached out to point with his forefinger to a spot ahead of the small red, moving shape of the Mark V, where a tributary almost as large as the main river joined it at that spot. Up beyond the point of joining, the tributary spread itself out into a number of small streams and marshland.

"There's an unusually high tide tonight, as you know," Cletus said. "So from this point on down they'll



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be at least an extra eight feet of water in the main channel. Enough extra depth so that any small upriver motor launch could make it down into Bakhalla harbor, towing a good load of supplies, and personnel behind it, safely underwater in a drogue pod. It's just a guess on my part, of course, but it hardly seems to me that the guerrillas would let a chance like this slip by without making an effort to get men and supplies to their people in the city."

Wefer stared at the map; and slapped his leg in delight.

"You're right!" he exploded. "Ensign, we're headed for that confluence Colonel Grahame just pointed out. Button up for noise; and get the weapons turret uncovered topside."

"Aye, aye, sir," answered the ensign.

They reached the juncture point between the tributary and the mainstream which Cletus had pointed out. The Mark V crept out of the channel into the relatively shallow water near the river bank opposite the mouth of the tributary; and stopped here, its turrets less than five feet below the river surface. The sensor float was released from the upper hull of the vehicle; and popped to the surface—a small buoyant square of material with the thin metal whisker of a sensor rod rising one meter from it into the air, the two connected by a fine wire to the communications equipment of the Mark V. The sensor rod had to view the scene around it by available light only; but its resolving power was remarkable. The image of the scene it sent down to the hemispherical screen in the command room of the Mark V below was very nearly as clear as if broad daylight, rather than a fingernail paring of a moon, illuminated the conjunction of the two streams.

"Not a hull in sight," muttered Wefer, rotating the view in the hemispherical screen to take in the full one hundred and eighty degrees scanned by the sensor rod. "I suppose we'll just have to sit here and wait for them."

"You could be taking a few precautions, meanwhile," suggested Cletus.

Wefer glanced aside at him.

"What precautions?"

"Against their getting away downstream if by some chance they manage to slip by you," said Cletus. "Is there anything to stop you now from moving enough material into the channel downriver, so that if they do come by, they'll run aground just below us?"

Wefer stared at him in astonishment slowly changing to delight.

"Of course!" he exploded. "Ensign! Take her downstream!"

The Mark V moved roughly a hundred yards downstream; and, extending its massive dozer blade crosswise in front of it, began to shovel sand and silt from beneath



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the water near the river's edges into the main channel. Fifteen minutes work filled the channel for some fifty yards to a level even with the rest of the river bottom. Wefer was inclined to stop at that point; but Cletus suggested he further refine it, into a barrier consisting of a wide, sloping ramp rising gradually to within half a dozen feet of the surface. Then, also at Cletus's suggestion, the Mark V returned, not merely upstream but up into the tributary some fifty yards behind the point where it met with the waters of the main river.

Here, the water was so shallow that the Mark V sat with its turret out in the air. But a few moments work with the dozer blade sufficed to dig a shallow depression so that they could lie in wait completely underwater.

Then, the wait began. It was three hours—nearly midnight—before the sensor rod on its float, invisible against the shadow of the foliage lining the tributary's bank picked up the image of a motor launch sliding down the main channel of the tributary, its motor barely turning at a speed sufficient to keep the drogue pod towed behind it underwater.

They waited, holding their breaths, until ship and drogue had passed. Then Wefer jumped for the command phone, from which he had, some hours since, displaced the ensign.

"Wait—" said Cletus.

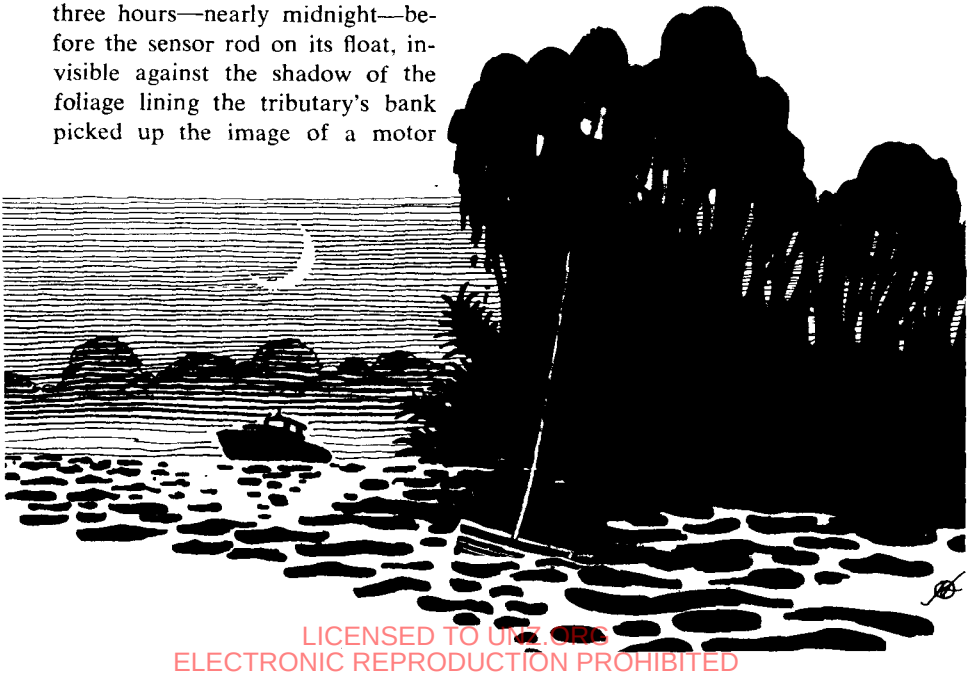
Wefer hesitated, staring at Cletus.

"Wait?" Wefer said. "What for?"

"You know that launch isn't going to be able to get past the barrier you built downstream," answered Cletus. "So why not sit here a little longer and see if another boat comes along?"

Wefer hesitated. Then he stepped back from the command phone.

"You really think another one



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might come along?" he asked, thoughtfully.

"I wouldn't be surprised," said Cletus cheerfully.

The answer was hardly out of his mouth before the sensor picked up another approaching motor launch with pod in tow. By the time this was well passed and out into the main river, still another launch had appeared. As Wefer stood staring in incredulous delight into the hemispherical screen, twenty boats towing pods passed within thirty yards of the submerged Mark V.

When a couple of minutes had gone by following the passage of the twenty boats and pods, Cletus suggested that probably it was time they were checking up on what had happened downstream. Wefer put the Mark V in motion. It surged up out of its shallow hole and plunged under the surface again, down into the main channel of the tributary.

They reached the central channel of the main river and turned downstream. Their infra-red searchlights underwater, as well as the sensor rod being towed to its float above them, gave them a picture of wild confusion just ahead of them. Of the twenty launches that had passed them, fully half were firmly aground in the sloping ramp of river bottom that the Mark V had built. The rest, still afloat but with their drogue pods bobbing helplessly on the surface behind them, were valiantly trying to tow the stranded vessels free.

Wefer commanded the Mark V to a halt. He stared into the screen with mingled elation and dismay.

"Now what?" he muttered to Cletus. "If I charge on down there, the ones that aren't stuck are just going to turn around and beat it upriver and get away. Of course I've got the weapons in the turret. But still, a lot of them are going to get past me."

"As a suggestion," said Cletus, "how's this Mark V of yours at making a wave?"

Wefer stared at him.

"A wave?" he said—and then repeated, joyously. "A *wave!*"

He barked orders into the command phone. The Mark V backed up a hundred yards along the channel of the main river and stopped. The two wings of its dozer blade, which had been folded back against its body to reduce drag while traveling, folded forward again and extended themselves to right and left, until the blades full area of twenty yards of width and ten feet of height were exposed. Delicately, Wefer tilted the front of the Mark V upward until the top half of the blade poked through the surface of the river and the treads were swimming freely in the water. Then he threw the engines into full speed, forward.

The Mark V rushed down the river in a roar of water, checked



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itself and sank itself to the bottom of the channel just fifty yards short of the still-floating launches. For a moment a wall of water hid the scene ahead; and then this passed, speeding like an ever diminishing ripple farther downstream.

Left behind, was a scene of wreckage and confusion.

Those launches that had already been aground had had their decks swept by the wave which the Mark V had created. In some cases they had been flipped on their side by that wave, or even turned completely upside down. But the greatest effect was to be seen upon those launches which still had water under their keels and had been trying to tow the grounded ones loose.

Without exception, these free-floating boats had been driven aground as well. In many cases they had been literally hammered into the soft soil of the piled-up riverbed. One launch was standing on its nose, its prow driven half a dozen feet into the sand and silt, below.

"I think they're ready for you now," Cletus said to Wefer.

If anything more was needed to complete the demoralization of the guerrillas aboard the launches, it was the sight of the black shape of the Mark V roaring up into view out of the river depths, the two heavy energy rifles in its turret sweeping ominously back and forth. Almost without exception, those who had managed to cling to their battered crafts dove overboard at the sight and began to swim frantically for the banks of the river.

"Turret—" began Wefer excitedly. But Cletus put his hand over the phone.

"Let them go," Cletus said. "The important men'll still be sealed inside the pods. Let's see about collecting them before they get too worried by all that's happened and start breaking out."

The advice was good. The Neulanders inside the pods had reached the limits of their endurance with the tossing about they had taken in the wave generated by the Mark V. Already more than one of the pods bobbing helplessly on the surface of the water, still tethered to its grounded launch, was beginning to split along the top, as those within activated their emergency exit. Wefer wheeled the Mark V into the midst of the wreckage and sent his ensign with three seamen out the Mark V's top hatch with hand weapons to cover the Neulanders as they emerged and order them sternly to swim to the Mark V, where they were searched, put in wrist restraints, and herded down the hatch to be locked up in the Mark V's forward hold. Cletus and Melissa stayed discreetly out of sight.

Its forward hold crammed with prisoners, and the cargo pods filled with supplies in tow, the Mark V



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returned to its base at the Bakhalla Navy Yard. After disposing of their prisoners and their spoils, Cletus, Melissa and Wefer at last got into the city for that late—now, early morning—supper they had planned. It was after four in the morning when Cletus took a tired but happy Melissa back to her father's residence. However, as they approached their destination, Melissa sobered and fell silent; and when they pulled up in front of the door of the house which the Exotics had put at the disposal of herself and Eachan, she did not offer to get out of the car right away.

"You know," she said, turning to Cletus, "you're pretty remarkable, after all. First those guerrillas on our way into Bakhalla, then the ones you captured up at Etter's Pass. And now, tonight."

"Thanks," he said, "but all I did was anticipate the optimum moves for deCastries to make, and arrange to be on the scene when they were made."

"Again!" she said. "Why do you keep implying Dow is having a personal duel with you?"

"He is," said Cletus.

"The Outworlds Secretary for the Coalition—against some unknown lieutenant colonel in an Alliance Expeditionary force? Does that make sense?"

"Why not?" Cletus said. "He has a great deal more to lose than an unknown lieutenant colonel in an Alliance Expeditionary Force."

"But you're just imagining it all. You have to be!"

"No," said Cletus. "Remember I pushed him into an error of judgment with the sugar cubes in the dining lounge of the ship? The Outworlds Secretary for the Coalition can't afford to be made a fool of by an unknown Alliance lieutenant colonel—as you describe me. It's true nobody but you knows—and only because I told you—that he did make a mistake, then . . ."

"Was that why you told me what you'd done, then?" Melissa interrupted. "Just so I'd tell Dow?"

"Partly," said Cletus. She drew in her breath sharply in the darkness. "But only incidentally. Because it really didn't matter whether you told him or not. He knew I knew. And it simply wasn't good policy to let someone like me walk around thinking that I could beat him, at anything."

"Oh!" Melissa's voice trembled on the verge of anger. "You're making all this up! There's no proof, not a shred of proof for any of it!"

"There is, though," said Cletus. "You remember the guerrillas on the way into Bakhalla attacked the command car in which I was riding, instead of—as your father pointed out—the bus which would be a much more natural target for them. And this after Pater Ten had been burning up the ship-to-planet phone lines to Neuland before we left the ship."



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"That's coincidence—stretched coincidence, at that," she retorted.

"No," said Cletus, quietly. "No more than the infiltration through Etter's Pass, which, while it was also made to provide a coup for the Neulanders, would have had the effect of discrediting me as a tactical expert, before I had a chance to get my feet on the ground here and learn about the local military situation."

"I don't believe it!" Melissa said, vehemently. "It has to be all in your head!"

"If that's so, then deCastries shares the delusion," answered Cletus. "When I slipped out of both traps, he was impressed enough to offer me a job with him—a job, however, which obviously would put me in a subordinate position with regard to him. That happened at Mondar's party, when you stepped over to talk to Eachan and deCastries and I had a few moments together."

She stared at him through the night shadow of the car, as if trying to search out the expression on his face in the little light that reached them from the lamp beside the doorway of the house and the dawn-pale sky above the aircar.

"You turned him down?" she said, after a long moment.

"I just have. Tonight," said Cletus. "After the guerrillas on landing and Etter's Pass, he couldn't delude himself I wouldn't expect that the next obvious move for the Neulanders would be to take advantage of the high tide on the river to run in supplies and saboteurs to Bakhalla. If I'd let that infiltration take place without saying or doing anything, he'd have known that I'd become, to all intents and purposes, his hired man."

Again, she stared at him.

"But you—" she broke off. "What can you expect to get out of all this, this . . . chain of things happening?"

"Just what I told you on the ship," said Cletus, "to trap deCastries into a personal fencing match with me, so that I can gradually lead him into larger and larger conflicts—until he commits himself completely in a final encounter where I can use his cumulative errors of judgment to destroy him."

Slowly, in the shadow, she shook her head.

"You must be insane," she said.

"Or perhaps a little more sane than most," he answered. "Who knows."

"But . . ." she hesitated, as if she was searching for an argument that would get through to him. "Anyway, no matter what's happened here, Dow's going to be leaving now. Then what about all these plans of yours about him? Now he can just go back to Earth and forget you—and he will."

"Not until I've caught him in an error of judgment too public for



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him to walk away from, or hide," said Cletus. "And that's what I have to do next."

"One more . . . what if I tell him you're going to do that?" she demanded. "Just suppose the whole wild thing's true, and I go to Capital Neuland tomorrow and tell him what you're planning? Won't that ruin everything for you?"

"Not necessarily," said Cletus. "Anyway, I don't think you'll do that."

"Why not?" she challenged. "I told you on the ship, that first night, that I wanted help from Dow, for Dad and myself. Why shouldn't I tell him anything that might make him more likely to help me?"

"Because you're more your father's daughter than you think," said Cletus. "Besides, your telling him would be a waste of effort. I'm not going to let you throw yourself away on deCastries for something that'd be the wrong thing for Eachan and you, anyway."

She stared at him, saying nothing, for one breathless minute. Then she exploded.

"*You* aren't going to let me!" she blazed. "*You're* going to order my life and my father's, are you? Where'd you get that kind of conceit, to think you could know what's best for people and what isn't best for them—let alone thinking you could get what you think best for them, or take it away from them if they want it? Who made you king of the . . . king of everything—"

She had been fumbling furiously with the latch of the door on her side of the aircar as the words tumbled out of her. Now, her fingers found it, the door swung open and she jumped out, turning to slam the door behind her.

"Go back to your BOQ—or wherever you're supposed to go!" she cried at him through the open window. "I knew there was no point going out with you tonight; but Dad asked me. I should have known better. *Good night!*"

She turned and ran up the steps into the house. The door slammed behind her. Cletus was left to silence and the empty, growing light of the pale, dawn sky, unreachable overhead.

## XI

"Well, Colonel," said Bat, grimly, "what am I supposed to do with you?"

"The general could put me to use," said Cletus.

"Put you to use!" They were standing facing each other in Bat's private office. Bat turned in exasperation, took two quick steps away, wheeled and stepped back to glare up at Cletus once more. "First you make a grandstand play up by Etter's Pass; and it pays off so that you collect about five times as many prisoners as you had men to collect them with. Now you go



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out for a midnight picnic with the Navy and come back loaded with guerrillas and supplies bound for Bakhalla. Not only that, but you take a civilian along with you on this Navy spree!"

"Civilian, sir?" said Cletus.

"Oh, yes, I know the official story!" Bat interrupted him, harshly. "And as long as it's a Navy matter, I'm letting it ride. But I *know* who you had with you out there, Colonel! Just as I know that wooden-headed young character, Linet, couldn't have dreamed up the idea of capturing those motor launches full of guerrillas, himself. It was your show, Colonel; just like it was your show up at Etter's Pass! And I repeat, what am I going to do with you?"

"In all seriousness, General," said Cletus, in a tone of voice that matched his words, "I mean what I say. I think you ought to put me to use."

"How?" Bat shot at him.

"As what I'm equipped to be—a tactician," said Cletus. He met the glare from under the general's expressive brows without yielding, although his voice remained calm and reasonable. "The present moment's one in which I could be particularly useful, considering the circumstances."

"What circumstances?" Bat demanded.

"Why, the circumstances that've more or less combined to trap the Military Secretary of the Coalition, here on Kultis," Cletus replied. "I imagine there's little doubt, in the ordinary way of things, that Dow deCastries would be planning on leaving this planet in the next day or two."

"Oh, he would, would he?" said Bat. "And what makes you so sure that you know what a Coalition bigwig like deCastries would be doing—under any circumstances?"

"The situation's easily open to deduction," answered Cletus. "The Neulander guerrillas aren't in any different situation than our Alliance forces here, when it comes to the matter of getting supplies out from Earth. Both they and we could use a great many things that the supply depots back on Earth are slow to send us. You want tanks, sir. It's a safe bet the Neulander guerrillas have wants of their own, which the Coalition isn't eager to satisfy."

"And how do you make that out?" Bat snapped.

"I read it as a conclusion from the obvious fact the Coalition's fighting a cheaper war here on Kultis than we are," said Cletus, reasonably. "It's typical of Alliance-Coalition confrontations for the past century. We tend to supply our allies actual fighting forces and the equipment to support them. The Coalition tends merely to arm and advise the opposition forces. This fits well with their ultimate aim, which isn't so much to win all these minor conflicts they oppose us in, but to bleed dry the Alliance



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nations back on Earth, so that eventually the Coalition can take over, back there where they believe all the important real estate is."

Cletus stopped speaking. Bat stared at him. After a second, the general shook his head like a man coming out of a daze.

"I ought to have my head examined," Bat said. "Why do I stand here and listen to this?"

"Because you're a good general, sir," said Cletus, "and because you can't help noticing I'm making sense."

"Part of the time you're making sense . . ." muttered Bat, his eyes abstracted. Then his gaze sharpened and he fastened it once more on Cletus's face. "All right, the Neulanders want equipment from the Coalition that the Coalition doesn't want to give them. You say that's why deCastries came out here?"

"Of course," said Cletus. "You know yourself the Coalition does this often. They refuse material help to one of their puppet allies; but then, to take the sting out of the refusal, they send a highly placed dignitary out to visit the puppets. The visit creates a great deal of stir, both in the puppet country and elsewhere. It gives the puppets the impression that their welfare is very close to the Coalition's heart—and it costs nearly nothing. Only, in this instance, the situation's backfired, somewhat."

"Backfired?" said Bat. "But how?"

"The two new guerrilla thrusts that were supposed to celebrate deCastries visit—that business up at Etter's Pass, and now last night's unsuccessful attempt to infiltrate a good number of men and supplies into the city of Bakhalla, itself—have blown up in the Neulanders' faces," Cletus said. "Of course, officially, Dow's got nothing to do with either of those two missions. Naturally we know that he undoubtedly did know about them; and maybe even had a hand in planning them. But as I say, officially, there's no connection between him and them; and theoretically he could leave the planet as scheduled, without looking backward once. Only I don't think he's likely to do that now."

"Why not?"

"Because, General," said Cletus, "his purpose in coming here was to give the Neulanders a morale boost—a shot in the arm. Instead, his visits have coincided with a couple of bad, if small, defeats for them. If he leaves now, his trip is going to be wasted. A man like deCastries is bound to put off leaving until he can leave on a note of success. That gives us a situation we can turn to our own advantage."

"Oh? Turn to our advantage, is it?" said Bat. "More of your fun and games, Colonel?"

"Sir," answered Cletus, "I might remind the general that I was right about the infiltration attempt



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through Etter's Pass; and I was right in my guess last night that the guerrillas would try to move men and supplies down the river and into the city—"

"All right! Never mind that!" snapped Bat. "If I wasn't taking those things into consideration, I wouldn't be listening to you now. Go ahead. Tell me what you were going to tell me."

"I'd prefer to show you," answered Cletus. "If you wouldn't mind flying up to Etter's Pass—"

"Etter's Pass? Again?" said Bat. "Why? Tell me what map you want, and show me here."

"It's a short trip by air, sir," said Cletus, calmly. "The explanation's going to make a lot more sense if we have the actual terrain below us."

Bat grunted. He turned about, stalked to his desk and punched open his phone circuit.

"Send over Recon One to the roof here," he said. "We'll be right up."

Five minutes later, Cletus and Bat were en route by air toward the Etter's Pass area. The general's recon craft was a small but fast passenger vehicle, with antigrav vanes below its midsection and a plasma thrust engine in the rear. Arvid, who had been waiting for Cletus in the general's outer office, was seated up front in the copilot's seat, with the pilot and the vessel's one crewman. Twenty feet behind them in the open cabin space, Bat and Cletus conversed in the privacy provided by that distance and low voices. The recon craft approached the Etter's Pass area; and, at Cletus's request, dropped down from its cruising altitude of eighty thousand feet to a mere six hundred, and began slowly to circle the area encompassing Etter's Pass, the village of Two Rivers and the two river valleys that came together just below the town.

Bat stared sourly at the pass and the town below it, nestled in the bottom of the vee which was the conjunction of the two river valleys.

"All right, Colonel," he said. "I've taken an hour out of my day to make this trip. What you've got to tell me had better be worth it."

"I think it is," answered Cletus. He pointed at Etter's Pass and swung his fingertip from it down to the town below. "If you'll look closely there, sir, you'll see Two Rivers is an ideal jump-off spot for launching an attack through the Pass by our forces, as the first step in an invasion of Neuland."

Bat's head jerked around. He stared at Cletus.

"*Invade Neuland—*" he lowered his voice hastily, for the heads of all three men up front had turned abruptly at the sound of his first words. "Have you gone completely out of your skull, Grahame? Or do you think I have, that I'd even consider such a thing? Invading Neu-



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land's a decision that's not even for the General Staff back on Earth to make. It'd be the political boys in Geneva who'd have to decide that!"

"Of course," said Cletus, unruffled. "But the fact is, an invasion launched from Two Rivers could very easily be successful. If the general will just let me explain—"

"No!" snarled Bat, keeping his voice low. "I told you I don't even want to hear about it. If you got me all the way up here just to suggest that—"

"Not to suggest it as an actuality, sir," said Cletus. "Only to point out the benefits of the appearance of it. It's not necessary actually to invade Neuland. It's only necessary to cause the Neulanders, and deCastries, to realize such an invasion could be successful, if launched. Once they realize the possibility, they'll be under extreme pressure to take some counteraction to prevent it. Then, if after they have taken such action, we ourselves move to show that invasion was never our intention, Dow deCastries will have been involved in a local blunder from which it'll be impossible for him to detach his responsibility. The Coalition's only way of saving face for him and itself will be to cast all blame on the Neulanders; and penalize the Neulanders as evidence that the blame-casting isn't just rhetoric. The only form that penalizing can take is a lessening of Coalition help to Neuland. Naturally, any reduction in Coalition aid to the Neulanders puts our contribution to the Exotics in that much stronger position."

Cletus stopped talking. Bat sat for a long second, gazing at him with an unusual expression—something almost like awe—on the face below the heavy, expressive eyebrows.

"By God!" Bat said, at last, "you don't think in simple terms, do you, Grahame?"

"The complexity's more apparent than real," answered Cletus. "Everyone's more or less the prisoner of his current situation. Manipulate the situation and the individual often hasn't much choice but to let himself be manipulated as well."

Bat shook his head, slowly.

"All right," he said, drawing a deep breath, "just how do you plan to signal this fake invasion attempt?"

"In the orthodox manner," answered Cletus. "By maneuvering of a couple of battalions of troops in this area below the pass—"

"Hold on. Whoa—" broke in Bat. "I told you once before I didn't have spare battalions of troops lying around waiting to be played with! Besides if I order troops up here on anything like maneuvers, how am I going to claim later that there never was any intention to provoke Neuland in this area?"

"I realize you haven't any regu-



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lar troops to spare, General," said Cletus. "The answer, of course, isn't to use regular troops. Nor should you order them up here. However, the Dorsai regiment under Colonel Khan is engaged in jump-belt training right now. You could agree to a suggestion which Colonel Khan might make to the Exotics—and which the Exotics will certainly check out with you—that he bring his Dorsais up here for a week of live training jumps in this ideal terrain which combines river valleys, jungle and hill country."

Bat opened his mouth as if to retort—then closed it sharply. Slowly, his brows drew together in a thoughtful frown.

"Hm-m-m," he said. "The Dorsais . . ."

"The Dorsais," Cletus reminded him, "don't operate out of your budget. They're financed separately by the Exotics."

Bat nodded, slowly.

"A full two battalions of men in this area," went on Cletus, "are too many for deCastries and the Neulanders to ignore. The fact that they're Dorsais rather than your own troops makes it seem all the more likely you're trying to pretend innocence, when in fact you've got some thrust into Neulander territory in mind. Add one more small factor, and you'll make suspicion of such a thrust a certainty, to deCastries at least. He knows I've been concerned with the two recent incidents when the Neulanders were frustrated. Appoint me your deputy general commander of this Dorsai unit, with authority to move them wherever I want—and nobody on the other side of the mountains will have any doubt left that the jump training is only a cover for an attack on Neuland territory."

Bat jerked his head up and stared at Cletus suspiciously. Cletus returned his gaze with the calm innocence of a man whose conscience has nothing to hide.

"But you *won't* be moving those Dorsais anywhere, except between Bakhalla and this area, will you, Colonel?" he demanded softly.

"I give you my word, sir," said Cletus. "They'll go nowhere else."

For a long moment Bat continued to stare, hard, at Cletus. But then, once again, slowly he nodded.

They returned to Bat's office in Bakhalla. As Cletus was leaving, headed for his staff car in the parking lot, a flier settled into one of the marked spaces and Mondar got out, followed by the small, waspish shape of Pater Ten.

"There he is," said Pater Ten, in a brittle voice as he spotted Cletus. "Why don't you go ahead into the Headquarters building, Outbond? I'll stop a minute with Colonel Grahame. Dow wanted me to extend his congratulations on Grahame's success last week—and last night."



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Mondar hesitated briefly, then smiled.

"As you like," he said, turned and went on toward the Headquarters building. Pater Ten walked over to face Cletus.

"Congratulate me?" asked Cletus.

"The Military Secretary," said Pater Ten, almost viciously, "is a very fair-minded man—"

In midsentence he broke off. For a second some inner change seemed to wipe his face clean of expression; and then it shaped itself again into a different set of expression. An expression like that of an excellent stage mimic who had decided to impersonate the character and mannerisms of Dow de-Castries. Only, Pater Ten's eyes were fixed and remote like a man under hypnosis.

When he spoke, it was in an eerie echo of Dow's speech.

"Evidently," said those silkily urbane tones, "you're still trying to raise the ante, Grahame. Take my advice. Be warned. It's an occupation that's fraught with danger."

As abruptly as it had come, the unnatural resemblance to Dow smoothed itself from the little man's features and his gaze became normal again. He looked sharply up at Cletus.

"Very fair-minded," Pater said. "You underestimate him. I promise you, you've underestimated him—"

The little man broke off, abruptly.

"Why are you looking at me like that?" he snapped, acidly. "You don't believe me, is that it?"

Cletus shook his head, sadly.

"I believe you," he said. "It's just that I see I underestimated him. He's not just a dealer in other people's minds. He buys souls, as well."

He turned and walked off to his car, leaving Pater Ten staring after him uncomprehendingly, but with the automatic rage on his face with which that violent little man viewed nearly all things in the universe.

## XII

They met in Eachan Khan's office a week later—Cletus, Eachan and the four other top officers among the Dorsais. There was Eachan's second-in-command, Lieutenant Colonel Marcus Dodds, a tall, quiet, narrow-boned man. There were also a major with a shaved head and expressionless features in a hard, round, blue-black face, with the single name of Swahili, a Major David ap Morgan, who was thin and slightly buck-toothed and as fair-skinned as Swahili was dark; and, last, there was Captain Este Chotai, short, heavy-fleshed and handsome with narrow eyes in a slightly mongoloid face. They sat around the long conference table in Eachan's wide office, with Eachan at the top of the table and Cletus seated at his right.

". . . And so, gentlemen," said



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Eachan Khan, winding up his explanation of Cletus's presence in their midst, "we have a new commanding officer from the Alliance Forces. I'll let Colonel Grahame speak for himself from this point on."

Eachan got up from his chair at the head of the table, and stepped aside. Cletus rose, and Eachan took Cletus's former place at the table. Cletus moved over behind the chair Eachan had occupied; but he did not sit down immediately.

Instead, he turned about to look at the large map of the Etter's Pass—Two Rivers area, projected on the wall behind him. He looked at it and something deep, powerful and unyielding moved without warning through him. He drew in a slow deep breath and the silence of the room behind him seemed to ring suddenly in his ears. The features of the map before him seemed to leap out at him as if he saw, not the projected representation, but the actual features of jungle, hill and river that they represented.

He turned about and faced the Dorsai officers. Under his gaze they stiffened and their eyes narrowed as if something massive and unknown had stepped suddenly among them. Even Eachan stared at Cletus as if he had never seen him before.

"You're all professional soldiers," said Cletus. His voice was completely flat, without inflection or emphasis, but it rang in the room with a finality that left no room for doubt or argument in its listeners. "Your future depends on what you'll be doing in the next two weeks. Therefore I'm going to tell you what no one else on this planet yet knows; and I'm going to trust you to keep that information locked inside you."

He paused. They sat staring at him like men in a trance.

"You're going to fight a battle. My aim isn't going to be to kill the enemy, in this battle, but to force him to surrender in large numbers; so, if all goes according to plan, you ought to win with little or no casualties. I don't guarantee that. I only say that it ought to be that way. But, in any case, you'll have fought a battle."

He paused for a second, looking into their faces, one by one. Then he went on.

"Behind me here," he said, "you see the upland area into which you're going to move at the end of this week for further jump-training and jungle practice. This practice isn't just to fill time. The better shape your men are in at the end of the training period, the better they know the area, the better chance they'll have to survive in the fight, later. Colonel Khan will give you your specific orders. That's all I'll tell you now. As I say, I don't want you to tell anyone, not even the men you command, that any sort of real action's in prospect. If you're the kind of



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officers I think you are, and they're the kind of men I think they are, they'll absorb the feeling that something is going to happen without your having to tell them. That's all."

He sat down abruptly and turned to Eachan.

"Take over, Colonel," he said to Eachan.

Eachan, unmoving, continued to gaze at him for just a fraction of a second longer before he rose, cleared his throat and began to describe the patterns of movement of the various units from Bakhalla into the Two Rivers area.

Four days later support ships of the type that had flown Cletus with Lieutenant Athyer and his troops up to Etter's Pass, began ferrying the mercenary soldiers to Two Rivers. Cletus went up on one of the early flights, and toured the area with Eachan Khan. Cletus's first concern was for the town, or village—it was really more village than town—of Two Rivers, itself.

The settlement was actually a tight little v-shaped clump of condominiums and individual homes surrounding a warehouse and business section and filling the triangular end-point of flat land where the valleys of the Blue and Whey rivers came together. This patch of flatland extended itself with a few scattered streets and buildings up the valley of each river for perhaps a quarter of a mile before the river banks became too high and steep for much building to be practical. The town was a community essentially supported by the wild-farming of a majority of its inhabitants. Wild farming being the planting of native or mutated trees and plants bearing a cash crop in the surrounding jungle areas, without first dividing up, or clearing the land. A wild farmer owned no territory. What he owned were a number of trees or plants which he tended and from which he harvested the crops on a regular basis. Around Two Rivers a sort of native wild cherry and mutated rubber plants introduced by the Exotics four years ago were the staple wild-farm crops.

The local people took the invasion by the Dorsais in good spirits. The mercenaries were notoriously quiet and better-mannered in their off-duty hours than regular troops. Besides, they would be spending money in the town. The locals, in general, paid little attention to Cletus, as with Eachan Kahn he marked out positions for strong points with dug-in weapons, on each near bank of the two rivers just above the town and down within the open land of the community itself. When Cletus had finished, he had laid out two v-shaped lines of strong points, one inside the other, covering the upriver approaches to the town, and the river conjunction itself.

"Now," said Cletus to Eachan,



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when this was done, "let's go take a look up beyond the pass."

They took one of the support ships which had just discharged its cargo of Dorsai soldiers and was about to return to Bakhalla for another load. With it they flew up and over the area of Etter's Pass; and made a shallow sweep over some ten miles of mountainous territory beyond it, to where the ground sloped away into the farther jungle that was Neuland territory.

"I expect the Neulanders will be coming around to see what we're doing," he said to Eachan, "as soon as their people in Bakhalla tell them the Dorsais've moved here for training. I want this side of the mountains kept under observation by men who won't be spotted themselves. I assume you've got people like that?"

"Of course!" said Eachan. "I'll have a watch on here all twenty-six hours of the day. How soon do you want it to start?"

"Right away," answered Cletus.

"I'll have men started out in half an hour," Eachan answered. "Anything else?"

"Yes," Cletus said. "I want those defensive strong points in and above the town, dug in, with an earth wall inside and sand bags outside so that it's at least six feet thick at the base and seven feet above the level of the ground outside at the top."

Eachan frowned slightly. But his reply was laconic. "Yes, Colonel."

"That's it, then," said Cletus. "I'm headed back to Bakhalla. I'll have the ship drop you back down at Two Rivers, first. Are you planning on coming back to town, later?"

"This evening," he answered, "as soon as I've got all the men moved in here and set up. I'm planning on commuting. Here, days; Bakhalla, nights."

"I'll see you back at the city then," said Cletus. He turned to the pilots of the support ship. "Take us back to Two Rivers."

He dropped off Eachan and went back to Bakhalla. There he found his work waiting for him—in two stacks. For, in accepting a role as Bat's deputy commanding officer of the Dorsais, he had in essence taken on another full job. The Dorsais operated with a small-to-nonexistent headquarters staff, as they did in all areas requiring noncombatant personnel. In the field, each Dorsai was his own cook, launderer and bottle-washer; and each officer was responsible for all paper work involving his command. Away from the field, in barracks so to speak, men were hired from the regular fighting units at a small addition to their ordinary wages, to work as clerks, cooks, vehicle drivers and the rest. But in the field there was none of this.

Those Dorsais, therefore, who would ordinarily have lightened



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Cletus's paper workload concerning the mercenary soldiers were now in battle gear up at Two Rivers. It was this fact that also required Eachan to commute back to Bakhalla every night to take care of his own paper work.

Cletus, of course, had the use of the staff Arvid had collected to help in making his forecasts of enemy activity. But that staff, including Arvid himself, was fully occupied with their regular job, at least during normal working hours. Cletus had set them to functioning as a research service. They were collecting information on both Neuland and the Exotic colony, plus all the physical facts about Kultis, such as weather, climate, flora and fauna, which pertained to the two opposed peoples. This information was condensed and fed to Cletus as soon as it was available; and at least half his working day had to be taken up in absorbing and digesting it.

So it was that the first five days after the Dorsais had been moved up to Two Rivers, Cletus spent at his office between the hours of seven in the morning and midnight, with very few breaks in between. About seven o'clock of the fifth evening, after the rest of the staff had already left for the day, Wefer Linet showed up unexpectedly.

"Let's go catch some more Neulander guerrillas," Wefer suggested.

Cletus laughed, leaned back in his chair and stretched wearily.

"I don't know where there are any, right now," Cletus said.

"Let's go have dinner then and talk about it," said Wefer craftily. "Maybe between the two of us we can figure out how to find some."

Cletus laughed again, started to shake his head and then let himself be persuaded. After the dinner, however, he insisted on returning to his desk. Wefer came back with him; and only reluctantly took his leave at last when Cletus insisted that work yet undone required his immediate attention.

". . . But don't forget," Wefer said on his way out, "you'll call me if anything comes up. I've got five Mark Vs, and four of them are yours, on half an hour's notice. It's not just me, it's my men. Everyone who was with us there on the river has been spreading the story around until I haven't got anyone in my command who wouldn't chop off his right arm to go with you if another chance comes up. You'll find something for us to do?"

"It's a promise," said Cletus. "I'll turn up something for you shortly."

Wefer at last allowed himself to be ushered out. Cletus went back to his desk. By eleven o'clock he had finished the extensive and detailed orders he had been drafting to cover the actions and contingencies of the next two days. He made up a package of those orders



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which were to be passed on to Eachan Khan for application to the Dorsai troops; and, going out, drove himself in a staff aircar to the Headquarters building in the Dorsai area.

He parked in front of it. There were two other cars waiting there; and the one window of Eachan's office that faced him was alight. The rest of the building—a temporary structure of native wood, painted a military light green that looked almost white in the pale light of the now nearly-full moon overhead—was dark, as were all the surrounding office and barracks buildings also. It was like being in a ghost town where only one man lived.

Cletus got out of the car and went up the steps into the front hall of the building. Passing through the swinging gate which barred visitors from the clerks normally at work in the outer office, he went down the corridor beyond that outer office to where the half-open door of Eachan's private office was marked by an escaping streak of yellow light that lay across the corridor floor. Coming quietly up on that patch of light, Cletus checked, suddenly, at the sound of voices within the room.

The voices were those of Eachan and Melissa—and their conversation was no public one.

Cletus might have coughed, then, or made some other noise to warn that he had come upon them. But at that moment he heard his own name mentioned—and instantly guessed at least half of the conversation that had gone before. He neither turned and retreated, therefore, nor made a sound. Instead he stood, listening.

". . . I thought you liked young Grahame," Eachan had just finished saying.

"Of course I like him!" Melissa's voice was tortured. "That's got nothing to do with it. Can't you understand, Dad?"

"No." Eachan's voice was stark.

Cletus took one long step forward, so that he could just see around the corner of the half-open door into the lighted room. The illumination there came from a single lamp, floating a foot and a half above the surface of Eachan's desk. On opposite sides of that desk, Eachan and Melissa stood facing each other. Their heads were above the level of the lamp, and their faces were hidden in shadow, while the lower parts of their bodies were clearly illuminated.

"No, of course you can't!" said Melissa. "Because you won't try! You can't tell me you like this better—this hand-to-mouth mercenary soldiering—than our home in Jalalabad! And with Dow's help you can go back. You'll be a general again. That's *home,* Dad! Home on Earth, for both of us!"

"Not anymore," said Eachan deeply. "I'm a soldier, Melly. Don't you understand? A *soldier!* Not



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just a uniform with a man walking around inside it—and that's all I'd be if I went back to Jalalabad. As a Dorsai, at least I'm still a soldier!" His voice became ragged, suddenly, "I know it's not fair to you but can't you—"

"I'm not doing it for me!" said Melissa. "Do you think I care? I was just a girl when we left Earth—it wouldn't be the same place at all for me, if we went back. But Mother told me to take care of you. And I am, even if you haven't got the sense to take care of yourself."

"Melly . . ." Eachan's voice was no longer ragged, but it was deep with pain. "You're so sure of yourself—"

"Yes, I am!" she said. "One of us has to be. I phoned him, Dad. Yesterday."

"Phoned deCastries?"

"Yes," Melissa said. "I called him in Capital Neuland. I said we'd come any time he sent for us from Earth. *We'd* come, I said, Dad. But I warn you, if you won't go, I'll go alone."

There was a moment's silence in the darkness hiding the upper part of Eachan's stiff figure.

"There's nothing there for you, girl," he said, hoarsely. "You said so, yourself."

"But I'll go!" she said. "Because that's the only way to get you to go back, to say I'll go alone if I have to—and mean it. Right now, I promise you, Dad—"

Cletus did not wait to hear the end of that promise. He turned abruptly and walked silently back to the front door of the building. He opened and closed the door, banging the heel of his hand against it noisily. He walked in, kicked open the gate in the fence about the outer office area and walked soundingly down the hall toward the light of the partly opened door.

When he entered the office room, the overhead lights had been turned on. In their bright glare, Melissa and Eachan still stood a little apart from each other, with the desk inbetween.

"Hello, Melissa," Cletus said. "Good to see you. I was just bringing in some orders for Eachan. Why don't you wait a few minutes and we can all go have a cup of coffee, or something?"

"No, I—" Melissa stumbled a little in her speech. Under the overhead lights her face looked pale and drawn. "I've got a headache. I think I'll go right home to bed." She turned to her father. "I'll see you later, Daddy?"

She turned and went out. Both men watched her go.

"I'll be home before long," Eachan answered.

When the echo of her footsteps had been brought to an end by the sound of the outer door of the office building closing, Cletus turned back to face Eachan and threw the



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package of papers he was carrying onto Eachan's desk between them.

"What's the latest word from the scouts watching the Neulander side of the mountains?" Cletus asked, watching the older man's face and dropping into a chair on his side of the desk. Eachan sat down more slowly in his own chair behind the desk.

"The Neulanders've evidently stopped moving men into the area," Eachan said. "But the scouts estimate they've got thirty-six hundred men there now—nearly double the number of our Dorsai troops. And they're regular Neulander soldiery, not guerrillas, with some light tanks and mobile artillery. My guess is that's better than sixty per cent of their fully-equipped, regular armed forces."

"Good," said Cletus. "Pull all but a couple of companies back into Bakhalla."

Eachan's gaze jerked up from the packet of orders to stare at Cletus's face.

"Pull back?" he echoed. "What was the point in going up there, then?"

"The point in going up there," said Cletus, "was to cause Neuland to do exactly what they've done—assemble troops on their side of the mountain border. Now we pull back most of our men, so that it looks as if we've lost our nerve. Either that, or never intended to be a threat after all."

"And was that what we intended?" Eachan looked narrowly at Cletus.

Cletus laughed cheerfully.

"Our intent, just as I say," he answered, "was to make them assemble a large force on their side of the pass through the mountains. Now, we can pack up and go home—but can they? No doubt you've heard the army rumor—and by this time the Neulanders will have heard it, too—that General Traynor and myself were overheard discussing an invasion of Neuland; and that we made a special trip up to Etter's Pass to survey it with that in mind."

"You mean," said Eachan, "that deCastries and the Neulanders will be sure that we really meant to invade them?"

"I mean just the opposite," said Cletus. "There's a great deal of truth to the fact that a liar is always going to suspect you of lying and a thief'll always suspect your honesty. DeCastries is a subtle man; and the weakness of subtle men is to suspect any straightforward action of being a screen for some kind of trick. DeCastries is sure to have concluded the rumor was leaked specifically for the purpose of causing him—and Neuland—to move a lot of troops into position on a false invasion scare, which would evaporate then and leave them looking foolish. Consequently, being the man he is, he'll have resolved to play along with our game and take advantage of us



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at the very moment we plan to be chuckling over his embarrassment."

"I don't believe I follow you," Eachan said.

Cletus nodded at the package of papers.

"It's all in the orders, there," he said. "You'll start withdrawing men from the Two Rivers area early tomorrow, a shipload at half hour intervals. As each shipload gets back here and gets sorted out, turn them loose on three-day passes."

Eachan stared at him, grimly.

"And, that's it?" Eachan said.

"That's it—until I give you further orders," said Cletus, getting to his feet. He turned about and headed toward the door.

"Good night," said Eachan behind him. As Cletus went out the door and turned left to go off down the corridor, he caught a glimpse of Eachan, still standing behind the desk, looking after him.

Cletus went back to his quarters and to bed. The next morning he allowed himself the unusual luxury of sleeping late. It was ten a.m. by the time he drifted into the Officers' Club for a late breakfast and just short of noon when he finally arrived at his office. Arvid, and the staff Arvid had accumulated there were all diligently at work. Cletus smiled at them like an indulgent father; and called them all together.

"I'm flying up to Two Rivers this afternoon," he said, "to supervise the windup of the Dorsai exercises up there. So there's not much point in your feeding me with a lot of information material that'll go stale between now and Monday morning, anyway. I've been working you all above and beyond the call of duty. So take the rest of the day off—all of you, that is, except Arvid"—he smiled at the big young officer—"and I'll see you again at the beginning of next week."

The staff evaporated like a scattering of raindrops on hot pavement, after a tropical shower. Once they were gone, Cletus went carefully around the office, making sure all its security systems were in working order ready to be put in operation. Then he came back, sat down opposite Arvid's desk, and reached over to pick up Arvid's phone. He dialed the number of the navy base.

"This is Colonel Cletus Grahame," he told the duty petty officer at the far end. "Would you try to locate Commander Linet for me, and have him call me back? I'm at my office."

He put the phone back on Arvid's desk and waited. Arvid was watching him, curiously. Cletus got up and walked over to his own desk. He picked up his own phone there and brought it back to exchange it for the phone in front of Arvid. Arvid's phone he took back to his own desk.

He punched out the first two digits of the five-digit number that



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would connect him with Bat Traynor's office. Then, with the phone activated, but the call uncompleted, he pushed the phone from him and looked over at Arvid.

"Arv," he said, "some time in the next few hours Eachan Khan's going to be calling me. If anyone but Colonel Eachan calls, I've just stepped out and you don't know when I'll be back. But if Colonel Eachan calls, tell him that I'm on the phone to General Traynor at the moment—and I will be. Ask him if you can take a message, or say I'll call him back in a few minutes."

Arvid frowned in slight puzzlement—but the frown evaporated almost immediately into his usual agreeable expression.

"Yes, sir," he said.

"And now?" he asked, after he had made the call.

"Now, we wait."

Wait, they did—for nearly two hours during which perhaps a dozen unimportant phone calls came in and were neatly fielded by Arvid. Then the phone Cletus had moved from his desk to in front of the young lieutenant buzzed abruptly, and Arvid lifted it up.

"Colonel Grahame's office, Lieutenant Johnson speaking—" Arvid broke off, glancing over at Cletus. "Colonel Khan? Yes, sir . . ."

Cletus had already picked up Arvid's phone and was completing the punching of the proper sequence of numbers for contact with Bat's office. In the background, he heard Arvid saying that he could take a message. Bat's office answered at the other end of the phone.

"This is Colonel Grahame," Cletus said into the phone. "I'd like to talk to General Traynor right away. In fact, immediately. It's red emergency."

He waited. There was a fractional delay at the other end of the line. Arvid, meanwhile, had hung up. There was silence in the office. Cletus could see out of the corner of his eye how Arvid was standing, watching him.

"Grahame?" Bat's voice exploded suddenly against Cletus's ear. "What's all this?"

"Sir," said Cletus, "I discovered something; and I think I ought to talk to you about it right away—privately. I can't tell you over the phone. It's got to do with the Coalition and it involves not only us, here on Kultis, but the whole Alliance. I'm at my office. I've given my staff the rest of the day off. Could you make some excuse to leave your office and come over here so that we could talk, privately?"

"Talk? What is all this—" Bat broke off, abruptly. Cletus heard the other's voice, suddenly withdrawn from the mouthpiece of the phone, speaking distantly to someone else. "Joe, go get me that file on . . . the plans for the new military district south of town."



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There were a few more seconds of pause, and then Bat's voice came back close to the phone but muted and cold in tone.

"*NOW* you can tell me," he said.

"I'm sorry, sir," said Cletus.

"Sorry—? You mean you don't even trust the phone circuits to my office?"

"I didn't say that, sir," answered Cletus evenly. "I only suggested that you make some excuse to get out of your office and meet me privately over here at mine."

His voice was almost wooden in its lack of expression. There was a long pause at the other end of the phone circuit. Then Cletus heard Bat's indrawn breath hiss sharply.

"All right, Grahame," said Bathen. "But this better be as serious as you're making it sound."

"Sir," said Cletus seriously, "without exaggeration, it concerns not only the highest Coalition personnel presently on the planet, but members of our own Alliance command here in Bakhalla, as well."

"See you in fifteen minutes," said Bat. The phone circuit clicked in Cletus's ear, and went dead.

Cletus put the phone down and turned to look at Arvid. Arvid was staring at him.

"Eachan's message?" Cletus prompted, gently. With a start, Arvid came out of his trance.

"Sir, the Neulanders are attacking Two Rivers!" he burst out. "Colonel Khan says they're coming in both by air and through the pass. And there's less than three companies of Dorsais left in Two Rivers, not counting a few scouts still out in the jungle who'll have been captured or bypassed by the Neulander troops by this time."

Cletus picked up the phone and punched for Lieutenant Colonel Marcus Dodds at the landing field by the Dorsai military area.

"Colonel Dodds—sir?" said the lean, quiet face of Eachan's second-in-command, appearing in the small phone screen.

"Have you heard about the Neulander attack at Two Rivers?" Cletus asked.

"Yes, sir," Dodds answered. "Colonel Khan just messaged us to stop all release of men. We're starting to get them turned around, now."

"Good," said Cletus. "I'll join you shortly."

He broke the circuit, put the phone down and crossed the room to an arms cabinet. Unlocking it, he took out a pistol belt and sidearm. He turned and tossed these to Arvid. Arvid put out one hand automatically and caught them.

"Sir?" he said, puzzled. "The Neulanders aren't attacking in the city, here, are they?"

Cletus laughed, reclosing and locking the arms cabinet.

"No, Arv," he said, turning back to the tall young lieutenant. "but the Neulanders have started to move up at Two Rivers; and Dow



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deCastries is the kind of man to want to take out insurance, even when he has a sure thing. I'd look a little strange wearing a sidearm, but you can wear it for me."

He turned back to his desk phone and punched for the navy base.

"This is Colonel Grahame," he said. "A little while ago I put in an important call for Commander Linet—"

"Yes, sir," said the voice of the ensign who had answered the phone. "The commander's been trying to get you, sir, but your circuits were busy just now. Just a minute, sir—"

Wefer's voice broke in on the line.

"Cletus! What's up?"

"You offered me the use of four of your Mark Vs," Cletus said. "I only need three of them. But they have to move upriver between here and the town of Two Rivers, at the confluence of the Blue and the Whey. That's nearly two hundred and thirty miles of river travel. Do you think they could make it between now and say, an hour before dawn tomorrow?"

"Two hundred and thirty miles? Between now and an hour to dawn? Nothing to it!" shouted Wefer over the phone circuit. "What's up?"

"The Neulanders have moved regular troops across the border at Etter's Pass," said Cletus, in a level voice. "They'll be attacking Two Rivers shortly after sunup tomorrow. I'll give you the details of what I want you for, later. But can you move your Mark Vs to within a mile downstream of where the two rivers come together and hold them there without being seen?"

"You know I can!" said Wefer. "But you'll be in touch?"

"I'll be contacting you before dawn tomorrow," said Cletus.

"Right! We're on our way!" The phone clicked dead at Wefer's end.

"Go ahead, Arv," said Cletus. "Wait for me outside at the car. I'll be along in a minute."

Arv stared.

"We're leaving . . .?" he said. "But, sir, isn't the general due . . ."

His voice ran down into silence as Cletus stood patiently waiting.

"Yes, sir," he said.

He went out.

Cletus put the phone in his hand back down on the desk by which he was standing. He glanced at his watch. Some eight minutes had gone by since he had spoken to Bat, and Bat had said that he would be here in fifteen minutes. Cletus made a last tour of the office to make sure all the security devices were in order. Then he let himself out the front door, pulling the door to, but leaving it slightly unlatched, with the trap spring activated. The next person to walk through that door, would find it closing automatically behind him, locking him into an area from



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which escape was not easily possible.

Cletus turned and went out to his staff car where Arvid waited. They drove off toward the BOQ.

## XIII

As Cletus's command car tilted on its air cushion and slid around the corner into the short street leading toward the BOQ, Cletus saw the parking lot before the BOQ half-filled with parked cars, clustered before the main entrance of the building in two rows with a narrow aisle in between.

Both ends of the parking lot were empty; and the building itself, with those other buildings of the officers' compound beyond it, seemed to slumber emptily under the noonday sun. The BOQ's occupants for the most part would now be either at work, at lunch, or asleep within. As the staff car slid on its air cushion toward the entrance to the parking lot, Cletus raised his eyes, and caught the glint of sunlight on something metallic just below the ridge of the roof over the BOQ's main entrance.

Cletus looked at the empty-windowed double row of cars, sitting flat on the cement of the parking lot, with their air cushions turned

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off. His lips thinned. At that moment as they turned into the aisle between the two rows of cars, there were sizzling sounds like the noise of enormous slices of bacon frying, above them, followed by several licking dragons-breaths of super heated air, as energy weapons sliced into the metal sides and roof of his command car like the flames of acetylene torches into thin tinfoil. Arvid fell heavily against Cletus, his uniform jacket black and smoking on the upper right side; and the staff car careened out of control to its right, into two empty parking spaces between cars, where it wedged itself, still on its air cushion between the grounded vehicles.

A bleak fury exploded inside Cletus. He turned, jerked the sidearm from its holster at Arvid's side, ducked down and punched open the door on his side of the staff car. He dove through it into the space between his car and the grounded one on the right. He rolled back under his own floating car and crawled rapidly to the back end of the grounded car on his left. Lying flat, he peered around its end. There was a man on his feet, energy rifle in hand, coming toward him, between the two rows of parked vehicles, at a run. Cletus snapped a shot from the sidearm; and the man went tumbling, head over heels. Cletus ducked around the car to his right and into the space between it and the next car.

The charge weapons now were silent. From memory of the sound and damage to the command car, Cletus guessed no more than three gunmen were involved. That left two to deal with. Glancing out, Cletus could see the man he had shot sprawled, lying still on the pavement, his energy weapon rolled out of his grasp, its transparent, riflelike barrel reflecting the sunlight. Cletus backed up, opened the near door of the car on his right and crawled in. Lying flat on its floorboards, he raised it on its air cushion and set it backing out in reverse.

As it reached the center space between the two rows of parked cars, he dived out the opposite door, just as two beams cut into the other side and roof of the car behind him. He snatched up the fallen charge weapon; and carrying it, scuttled behind the screen of the still moving car until it slammed into the opposite row of cars. Then he ducked into the closest available space there, turned about, and looked back around the nearest car end.

The other two gunmen were visible, standing out in the open now, back to back, by the car Cletus had last sent smashing into the ones opposite. One was facing Cletus's direction, the other in the opposite direction, both with their charge weapons up, and scanning the spaces between the vehicles for any sign of movement.



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Cletus pulled back, cradled the charge weapon in his left elbow, and lobbed his sidearm in a high arc over the heads of the two standing men to fall with a clatter, by Cletus's own cut-up command car.

Both of the gunmen spun about to face in the direction of the noise; and Cletus, standing up and stepping out from between his two parked cars, cut them down with the energy weapon he still held in his hands.

Breathing heavily, Cletus leaned for a second against the back of the car by which he had emerged. Then, throwing aside the energy weapon he still held, he limped hastily back toward the staff car in which Arvid still lay.

The big young lieutenant was conscious when Cletus arrived. He had taken a bad burn through the upper part of his chest and shoulder on the right side; but energy weapons were self-cauterizing. The wound was ugly, but there was no bleeding. Cletus eased him down onto the grass, and went into the BOQ to call for medical aid from an astounded military hospital unit.

"Guerrillas!" Cletus said briefly, in answer to their questions. "There're three of them—all dead. But my aide's wounded. Get over here as soon as you can."

He cut the connection and went back to see how Arvid was doing.

"How . . ." whispered Arvid.

"I told you deCastries would like insurance," said Cletus. "Lie still now, and don't talk."

The ambulance unit from the military hospital swooped down on them, then, its shadow falling across them like the shadow of some hawk from the skies, just before it landed softly on the grass beside them. White-uniformed Medics personnel tumbled out, and Cletus got to his feet.

"This is Lieutenant Johnson, my aide," said Cletus, indicating Arv. "Take good care of him. The three guerrillas out in the parking lot are all dead. I'll write up a full report on this later—but right now I've got to get going. You can handle things?"

"Yes, sir," said the Medico in charge. He was a senior, with the gold and black bars of a Warrant Officer on his collar. "We'll take care of him."

"Good," said Cletus.

Without stopping even to say any further word to Arvid, he turned and went up into the BOQ and down the hall to his own quarters. Swiftly, he changed into combat overalls and the straps of battle gear. When he came out, Arvid had already been taken away to the hospital and the three dead gunmen had been brought up and laid on the grass. Their clothes were the ordinary sort of civilian outfits normally seen on the streets of Bakhalla; but the lower part of the faces of each was pale in contrast



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to the tan of their foreheads, showing where heavy Neulander beards had been shaved off recently. Cletus tried his command car, found it operable, and slid off in the direction of the Dorsai area.

When he arrived there, he found most of the returned Dorsai troops already marshaled by units on the exercise ground, armed, equipped and ready to be enshipped back to Two Rivers. Cletus went directly to the temporary headquarters unit set up at one side of the field and found Lieutenant Colonel Marcus Dodd there.

"You haven't sent any shiploads back up yet, have you?" Cletus demanded, the moment Dodd saw him.

"No, Colonel," answered the tall, lean man. "But we should probably be thinking about moving men back up soon. If we try to have troops jump into Two Rivers after dark, three out of four of them are going to land in the river. And by daylight tomorrow, those Neulander troops will probably be in position in both river valleys above the town; and they'd have a field day picking off our jump troops if we send men in, then."

"Don't worry about it," said Cletus, brusquely. "We aren't going to jump into the town, in any case."

Marc Dodd's eyebrows raised in his narrow, brown face.

"You're not going to support—"

"We'll support. But not that way," said Cletus. "How many of the men that were sent back and turned loose on pass are still out?"

"Not more than half a company, probably, all told. They've been hearing about this and coming back on their own," said Marc. "No Dorsai's going to let other Dorsais be surrounded and cut up when he can help—"

He was interrupted by the phone ringing on the field desk before Marc. Marc picked it up and listened for a moment without comment.

"Just a minute," he said, and lowered the phone, pushing in on the muffle button. "It's for you. Colonel Ivor Dupleine—General Traynor's chief of staff."

Cletus reached out his hand and Marc passed the phone into it.

"This is Colonel Grahame," Cletus said into the mouthpiece. Dupleine's choloric face, tiny in the phone screen by Cletus's thumb, glared up at him.

"Grahame!" Dupleine's voice barked in his ear. "This is Colonel Dupleine. The Neulanders've moved troops over the border at Etter's Pass and seem to be setting up around Two Rivers. Have you still got any Dorsai troops up there?"

"A couple of companies in the town itself," said Cletus.

"Only a couple? That's not so bad, then!" said Dupleine. "All right, listen now. Apparently those Dorsais over there with you are



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getting all stirred up. You're not to make any attempt against those Neulander troops without direct orders. *That's* a direct order—from General Traynor himself. You understand? You just sit tight there until you hear from me, or the general."

"No," said Cletus.

For a moment there was a dead silence at the other end of the circuit. Dupleine's face stared out at Cletus from the phone screen.

"What? What did you say?" snapped Dupleine, at last.

"I ought to remind you, Colonel," said Cletus, quietly, "the general put me in complete command of these Dorsais with responsibility only to him."

"You—But I'm giving you the general's orders, Grahame! Didn't you hear me?" Dupleine's voice choked on the last word.

"I've got no proof of that, Colonel," said Cletus, in the same unvarying tone of voice. "I'll take my orders from the general, himself. If you'll have the general tell me what you've just told me, I'll be happy to obey."

"You're insane!" Dupleine broke off. For a long moment, he once more stared at Cletus. When he spoke again, his voice was lower, more controlled, and dangerous. "I think you know what refusing to obey an order like that means, Colonel. I'm going to sign off here and give you five minutes to think it over. If I haven't heard from you within five minutes, I'll have to go to the general with your answer just the way you gave it. Think about it."

The little screen in the phone went dark, and the click of the disconnected circuit sounded in the earphone. Cletus put the phone back on the desk.

"Where's your map projector?" he asked Marc.

"'Right over here," answered Marc, leading the way across the room to a horizontal table screen, with the black shape of a projector bolted beneath it. A map of the Etter's Pass area showed on the screen. As they both reached the edge of the table screen, Cletus put his finger on the marked position of Two Rivers town, where the streams of the Whey and the Blue came together.

"By dawn tomorrow morning," he said to Marc, "whoever's commanding those Neulanders will want to be in a position to start his attack on our troops in the town. That means—" Cletus' finger traced horseshoe-shaped curves, their open ends facing downstream, about the valleys of both the Whey and the Blue rivers just above the town. "Our men from here should be able to go in as jump troops—since they're fresh from training for it—just upriver of both those positions with comparative safety—since the Neulander forces should all be looking downriver. Now, I understand that the Neulanders



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don't have any real artillery, any more than we do. Is that right?"

"That's right, sir," Marc said. "Kultis is one of the worlds where we've had an unspoken agreement with the Coalition not to supply our allies, or our troops stationed with those allies, with anything more than portable weapons. So far as we know, they've kept to their part of the bargain as far as Neuland's concerned. Actually, they've needed anything more than hand weapons even less than we did, since up 'til now all their fighting's been done with native guerrillas. We can expect their troops to have light body armor, energy weapons, rocket and fire bomb launchers . . ."

Together they plotted the probable future positions of the Neulander troops, particularly those carrying the launchers and other special weapons. While they worked, a ceaseless stream of orders came in and out of the field HQ, frequently interrupting their talk.

The sun had set several hours before one of the junior officers again tapped Cletus deferentially on the elbow and offered him the phone.

"Colonel Dupleine, again, sir," the officer said.

Cletus took the phone and looked at the image of Dupleine. The face of the Alliance colonel looked haggard.

"Well, Colonel?" asked Cletus.

"Grahame—" began Dupleine, hoarsely, and then broke off. "Is anyone there with you?"

"Colonel Dodd of the Dorsais," answered Cletus.

"Could I . . . talk to you privately?" said Dupleine, his eyes searching around the periphery of the screen as if to discover Marc, who was standing back to one side out of the line of sight from the phone. Marc raised his eyebrows and started to turn away. Cletus reached out a hand to stop him.

"Just a minute," he said. He turned and spoke directly into the phone. "I've asked Colonel Dodd to stay. I'm afraid I'd prefer having a witness to whatever you say to me, Colonel."

Dupleine's lips sagged.

"All right," he said. "The word's probably spreading already. Grahame . . . General Traynor can't be located."

Cletus waited a second before answering.

"Yes?" he said.

"Don't you understand?" Dupleine's voice started to rise. He broke off, visibly fought with himself, and got his tones down to a reasonable level again. "Here the Neulanders have moved not just guerrillas, but regular troops, into the country. They're attacking Two Rivers—and now the general's dis . . . not available. This is an emergency, Grahame! You have to see the point in canceling any orders to move the Dorsai troops you have



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there, and coming over to talk with me, here."

"I'm afraid I don't," answered Cletus. "It's Friday evening. General Traynor may simply have gone somewhere for the weekend and forgotten to mention he'd be gone. My responsibility's to his original orders; and those leave me no alternative but to go ahead with the Dorsais, in any way I think best."

"You can't believe he'd do a thing like that—" Dupleine interrupted himself, fury breaking through the self-control he had struggled to maintain up until this point. "You nearly got gunned down by guerrillas yourself, today, according to the reports on my desk! Didn't it mean anything to you that they were carrying energy weapons instead of sport rifles? You know the Neulander guerrillas and saboteurs always carry civilian-level weapons and tools so they can't be shot as spies if they're captured! Doesn't the fact that three men with energy weapons tried to cut you down mean anything to you?"

"Only that whoever's giving the orders on the Neuland side," said Cletus, "would like to have me removed as commander of the Dorsai troops. Clearly, if they don't want me commanding, the best thing I can do for our side is to command."

Dupleine glared at him wearily from the phone screen.

"I warn you, Grahame!" he said. "If anything's happened to Traynor, or if we don't find him in the next few hours, I'll take emergency command of the Alliance Forces here, myself. And the first thing I'm going to do is to revoke Bat's orders to you and put you under arrest!"

The tiny screen in the phone went dark, the voice connection went dead. A little wearily, himself, Cletus put the phone down on the tablescreen, and rubbed his eyes. He turned to Marcus Dodd.

"All right, Marc," he said. "We won't delay any longer. Let's start moving our men back up to Two Rivers!"

## XIV

Cletus went in with the first wave of six transport craft. They circled eight miles upstream from Two Rivers and dropped their jump troops on both sides of the two river valleys. A reconnaissance aircraft, swinging low over the jungle in the darkness following moon-set, two hours before, had picked up the heat images of two large bodies of Neulander troops waiting for dawn in both the river valleys five miles above the town. Another, smaller, reserve force was camped just below the mouth of Etter's Pass—but its numbers were slight enough so that the Dorsais could disregard any counterattack from that direction. Cletus watched



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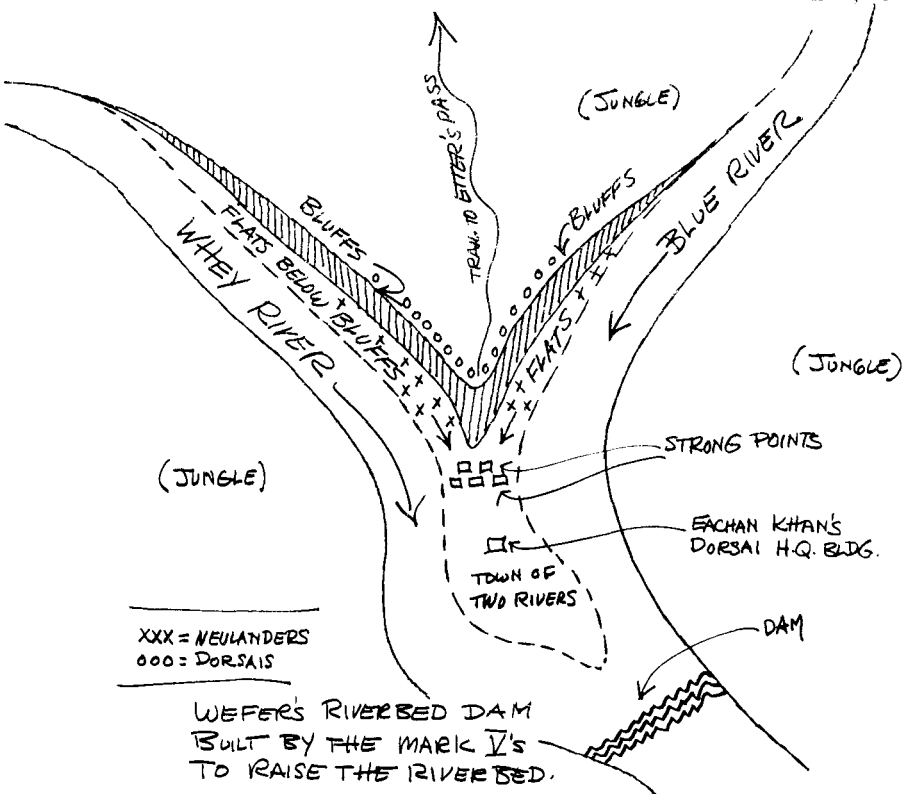
the flares of the jets from the jump belts of the descending men, and then ordered the pilot of his transport ship to fly low above the river heading downstream from the town.

A quarter mile below the town, the river curved to the right; and it was right around this curve that the response came from the M5s. The transport ship came down and hovered above the water; and the turret of one of the huge submarine dozers rose blackly from the dark waters.

Cletus went down an elevator sling to the turret, and the hatch in it opened. Wefer stepped out. Together they stood on the flight slope of the wet metal casing below the tower.

"Here we are, then," Wefer said. "Three of us, just like the doctor ordered." Under his black hair, his




MAP OF TWO RIVERS



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friendly, pugnacious face was excited in the dim light. "What do you want us to do?"

"The Neulander troops—and their regular troops—" said Cletus, "are concentrated in the two river valleys a few miles above the town. They'll be pushing down those valleys and into the town along the flatland below the river bluffs. But I don't think they'll be trying to come to the town from this downriver side. So you ought to be able to work without being seen."

"Sure, sure," said Wefer, sniffing the chilly dawn air like a hunting dog. "But what do you want us to do?"

"Can you plow up the bottom of the river just below the town, so as to raise the water level in and above the town?"

"In this little trickle of a river?" answered Wefer. "No trouble at all. We'll simply raise an underwater ridge at some point where the river bluffs on either side come straight down to the water's edge. The water has to rise to get over it. How high a dam? How much do you want to raise the water level?"

"I want the water six feet deep, a mile above the town," Cletus said.

For the first time, Wefer frowned.

"Six feet? A full fathom? You'll flood the town itself. That flat spot between the rivers the town's built on can't be more than six or eight feet above water level on both sides. You'll have another four to six feet of running water in the streets. Do you want that?"

"That's exactly what I want," said Cletus.

"Well . . . of course there's plenty of solid buildings there in the warehouse district for people to climb into," said Wefer. "I just don't want to get the navy billed for flood damage—"

"You won't be," said Cletus. "I'm still under General Traynor's direct orders as commander here. I'll take the responsibility."

Wefer peered at Cletus in the growing light, shook his head, and whistled admiringly.

"We'll get right at it then," he said. "You ought to have your fathom of water up above the city there in about four hours."

"Good," said Cletus. He stepped into the elevator sling and waved to the transport ship to pull him back up. "Good luck."

"Good luck to you and your Dorsais!" retorted Wefer. "You'll need it more than we do. We're just going to be doing our daily jobs."

Once back inside the transport Cletus ordered it to swing back up to within line of sight of Two Rivers itself. The sky was lightening rapidly now and the individual buildings in Two Rivers were easily picked out. Cletus had a coherent light beam trained on the curved reception mirror on the roof of the warehouse building which the Dorsais had taken over as their Two



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Rivers HQ during the week of jump practice. He sent a call down the light beam and got an immediate answer from Eachan, himself.

"Colonel?" Eachan's voice was distant, clipped and unruffled. "Been expecting to hear from you. I haven't had any reports from my scouts out in the jungle for better than three hours now. They're all either captured or lying low. But I gather the Neulanders are clustered in both river valleys above town. I've got all strong points here manned and ready."

"Fine, Colonel," said Cletus. "I just wanted to tell you to expect to get your feet wet. You might also warn the civilians in town to gather in the higher buildings of the warehouse district above the second floor."

"Oh? Thunderstorm coming?"

"We're not that lucky, I'm afraid," said Cletus. A good heavy rainstorm would have been all to the advantage of the well-trained Dorsai, both the jump troops and those in fixed positions in the city. "The weather forecast is for hot and clear. But the river's going to rise. I'm told you'll have four to six feet of water in the streets there."

"I see. I'll take care of it—with the troops and civilians, too . . ." Eachan broke off. "Are we getting reinforcements here in the town?"

"I'm afraid I can't spare you any," Cletus said. "But with luck, it'll be over one way or the other before the Neulanders are really on top of you. Do the best you can with the men you have."

"Understood," said Eachan. "That's all from this end then, Colonel."

"That's all from my end for the moment, too, Colonel," replied Cletus. "Good luck."

He broke the light beam contact and ordered the transport ship back to Bakhalla for a new load of jump troops. Now that it was open daylight over Two Rivers and there was no more secrecy to be gained by operating at low altitudes in the shadows below the peaks above the town, Cletus accompanied the next wave of jump troops riding in a courier craft which he set to circling above the reach of hand-weapon fire from the ground.

The second wave of Dorsai troops who went down on their jump belts were harassed, but ineffectively so, by fire from the Neulander troops downriver.

"Good enough," commented Marc Dodd, who had accompanied Cletus in the courier ship leaving Major David ap Morgan to take charge of getting off the last two remaining waves and accompanying the last as its commanding officer. "They'll have aircraft hitting our next wave, though. I don't know why they haven't had Neulander ships in the air over here before now."

"Another instance of the too imaginative minds," said Cletus. Marc glanced at him inquiringly,



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and Cletus went on to explain. "I was telling Eachan last night that too much subtlety could lead to mistakes. The Neulanders know that the Alliance has supplied the Exotics with many more and better air combat craft than the Coalition supplied them. So automatically, they've drawn the wrong conclusion. They think our lack of air cover is only apparent—bait to trap them into putting their own ships up so our superior air power can knock them down. Also, they know that only the Dorsais were jump-training; and they'll be suspecting that the Dorsais are the only ones who're being sent against them for that reason. They know they outnumber us two or three to one on the ground, which would tend to make them complacent."

The third wave came in and jumped to the jungle below. True to Cletus's assessment of the situation, there was no appearance of Neuland aircraft to oppose the jump. Nor was there with the fourth and final wave. With all waves of Dorsai jump troops now down on the ground, the pattern of Cletus's battle plan began to make itself felt. He had set his Dorsais down in the jungle on the top of the bluffs on either side of both rivers upstream from the concentration of Neulander troops. Now, spread out in skirmish lines, the Dorsais began to open up on the rear of the Neulander troops. The Neulanders fought back, but withdrew steadily, as their force began to move down into the river valleys toward the town. They showed no tendency to turn and fight and no panic at being caught by small arms fire from their rear. Up in their circling aircraft, Cletus and Marc kept in touch with their units on the ground by line-of-sight light-beam voice transmission.

"We aren't even slowing them down," said Marc, his mouth a straight line as he observed the scene below in the multiple reconnaissance screens set up before them.

"They'll be slowed up later," replied Cletus briefly.

He was very busy, plotting the movements of the running battle below on the reconnaissance screen even as he issued a steady stream of orders to individual small units of the Dorsai troops.

Marc fell silent and turned back to examining the situation on the reconnaissance screens as it was developing under the impetus of Cletus's orders. Before him, the two main elements of the Neulander forces were like large fat caterpillars crawling down the inner edge of the valley troughs of the two rivers, converging towards the single point that was the town of Two Rivers. Behind, and inland from the rivers the Dorsai troops, like thin lines of tiny ants, assailed these two caterpillars from the rear and the inland sides. Not that all this was visible to the naked eye be-



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low the thick screen of jungle cover. But the instruments and Cletus's plotting on the chart revealed it clearly. Under attack the caterpillars humped their rearward ends closer toward their front, bunching up under the attacks of the ants, but otherwise were undisturbed in their progress.

Meanwhile Cletus was extending his pursuing Dorsai troops forward along the inland side of each enemy force until the farthest extended units were almost level with the foremost troops of the enemy units they harassed. Occasionally they dented the Neulander lines they faced. But in case of trouble the Neulanders merely withdrew over the edge of the steeply sloping bluff, and fought the Dorsai back over what was in effect a natural parapet. Not merely that, but more and more their forward-moving units were dropping below the edge of the bluff with a skirmish line along its edge to protect their march—so that fully eight per cent of the enemy force was beyond the reach of the Dorsai weapons in any case.

Cletus broke off abruptly from his work on the screens and turned to Marc.

"They're less than two miles from the upper edge of the town," he said. "I want you to take over here and keep those Neulander forces contained all along their lines. Make them get down below the bluff and stay there; but don't expose men any more than you have to, doing it. Hold your troops back until you get word from me."

"Where're you going, sir?" Marc asked, frowning.

"Down," said Cletus, succinctly. He reached for one of the extra jump belts with which the aircraft was supplied and began strapping it on. "Put half a company of men on each river over the river on their jump belts and send them down the opposite side. They're to fire back across the river into any exposed elements of the enemy as they go but not to stop to do it. They're to keep traveling fast until they rendezvous with me down here."

He turned and tapped with his fingernail on the bend in the river below the town beyond which Wefer and his three Mark Vs were at work.

"How soon do you estimate they can meet me down there?" he asked.

"With luck . . . an hour," answered Marc, frowning. "What're you planning to do, sir . . . if you don't mind my asking?"

"I'm going to try to make it look as if we've got reinforcements into that town," Cletus said. He turned and called up to the pilot in the front of the reconnaissance ship. "Cease circling. Take me down to just beyond the bend in the main river there—point H29 and R7 on the grid."



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The aircraft wheeled away from its post above the battle and began to circle down toward the river bend. Cletus moved over to the emergency escape hatch, and put his hand on the eject button. Marc followed him, worriedly.

"Sir," he said, "if you haven't used a jump belt in a long time—"

"I know," Cletus interrupted him cheerfully. "It's a trick to keep your feet down and your head up, particularly when you're coming in for a landing. Don't worry—" He turned his head to shout to the pilot up front. "That patch of jungle just inside the bend of the river. Call 'Jump,' for me."

"Yes, sir," the pilot called back. There was a moment's pause and then, he shouted—"Jump."

"Jump," echoed Cletus.

He punched the eject button. The emergency door flipped open before him and the section of decking beneath his feet flipped him abruptly clear of the aircraft. He found himself falling toward the tops of the jungle treetops, six hundred feet below.

He clutched the hand control in the center of the belt at his waist; and the twin jets angling out from his shoulder tank flared thunderously, checking him in mid air with a wrench that left him feeling as if his back had been broken. For a moment, before he could catch his breath, he actually began to rise. Then he throttled back to a slow fall and began the struggle to keep himself in vertical position with his feet under him.

He was not so much falling, as sliding down at a steep angle into the jungle below. He made an effort to slow the rate of his fall, but the sensitive, tricky reactions of the jump belt sent him immediately into a climb again. Hastily, he returned the throttle to its first, instinctive fall-setting.

He was very nearly to the tops of the taller trees, now, and it would be necessary to pick his way between them, so as not to be brained by a branch in passing, or land in one of the deadly, dagger-like thorn bushes at the end of his ride. Careful not to twist the throttle grip in the process, he shifted the control handle slightly this way and that to determine the safe limits of a change of direction. His first attempt very nearly sent his feet swinging into the air, but he checked the swing and after a moment got himself back into a line of upright descent. There was a patch of relatively clear jungle down ahead to his right. Gingerly, he inched the control handle over, and was relieved as his airy slide altered toward the patch. Then, abruptly, he was among and below the treetops.

The ground was rushing at him. The tall, jagged stump of a lightning-blasted tree which he had not seen earlier because of the fact that it was partly covered with creepers blending in with the green of the



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ground cover, seemed to leap upward at him like a spear.

Desperately he jammed the handle over. The jets bucked. He went into a spin, slammed at an angle into the tree stump and smashed against the ground. A wave of blackness took him under.

## XV

When he came to—and it may only have been seconds later, he was lying twisted on the ground with his bad knee bent under him. His head was ringing; but, otherwise he did not feel badly.

Shakily he sat up and using both hands, gently began to straighten out his bad leg—

Then, there was pain, mounting and threatening unconsciousness.

He fought the unconsciousness off. Slowly, it receded.

He leaned back, panting against the tree trunk, to catch his breath. Gradually the pain in his knee faded, and his breathing calmed. His heartbeat slowed. He concentrated on relaxing the whole structure of his body and isolating the damaged knee. After a little while, the familiar floating sensation of detachment came to him. He leaned forward and gently straightened the knee, pulled up the pants leg covering it and examined it.

It was beginning to swell; but beyond that his exploring fingers could not tell him what serious hurt had been done it, this time. He could sense the pain like a distant pressure off behind the wall of his detachment. Taking hold of the tree trunk and resting all his weight on his other foot, he slowly pulled himself to his feet.

Once on his feet he gingerly tried putting a little of his weight on the knee. It supported him, but there was a weakness about it that was ominous.

For a moment he considered using the jump belt to lift him into the air once more, over the treetops and down to the river. But after a second he dismissed the idea. He could not risk another hard landing on that knee; and coming down in the river with as much current as this one was also impractical. He might have to swim; and swimming might also put the knee beyond use completely.

He unbuckled the jump belt and let it fall. Relieved of its weight he hopped on his good foot to a nearby sapling about two inches in diameter. Drawing his sidearm, he shot the sapling's trunk six feet above the ground, and again at ground level. Stripping off a few twigs left him with a rough staff on which he could lean. With the help of the staff he began hobbling toward the river's edge. He finally reached the bank of the gray, flowing water. He took the body phone from his belt, set it for transmission limited to a hundred yards, and called Wefer on the navy wavelength.



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Wefer answered; and a few minutes later one of the Mark Vs poked its massive, bladed snout out of the water ten yards in front of him.

"What now?" asked Wefer after Cletus had been assisted aboard and down into the control room of the Mark V. Cletus leaned back in the chair they had given him and stretched out his bad leg carefully.

"I'm having a company of men, half on each side of the river, meet us here in about"—he broke off to look at his watch—"thirty minutes or so now. I want one of your Mark Vs to take them, a platoon at a time, underwater up to the downriver end of the town. Can you spare one of your machines? How's the water level coming?"

"Coming fine," answered Wefer. "Those platoons of yours are going to find it knee deep in the lower end of town, by the time they get there. Give us another hour, and with only two machines I'll have the river as deep as you want it. So there's no problem about detaching one of the Mark Vs for ferry purposes."

"Fine," said Cletus.

He rode into the town himself with the last Mark V load of the ferried Dorsais. As Wefer had predicted, the water was knee deep already in the streets near the downriver end of the town. Eachan Khan met him as he limped into the Command Room of the Dorsai HQ in Two Rivers.

"Sit down, Colonel!" said Eachan, guiding Cletus into a chair facing the large plotting screen. "What's happening to the river? We've had to herd all the civilians into the tallest buildings."

"I've got Wefer Linet and some of those submarine dozers of his working downstream to raise the river level," answered Cletus. "I'll give you the details later. Right now—how are things with you here?"

"Nothing but some long-range sniping from the forward Neulander scouts, so far," said Eachan, coolly. "Those sandbagged strong points of yours were a fine idea. The men'll be dry and comfortable inside them while the Neulanders will be slogging through ankle-deep water to get to them."

"We may have to get out in the water and do a little slogging ourselves," said Cletus. "I've brought you nearly two hundred extra men. With these added to what you've got, do you think you could mount an attack?"

Eachan's face had never seemed inclined to any large changes of expression. But the stare he gave Cletus now was as close to the limits of visible emotion as Cletus had seen him go.

"Attack?" he echoed. "Two and a half—three companies, at most against six or eight battalions?"

Cletus shook his head.

"I said mount an attack. Not carry one through," he replied.



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"All I want to do is sting those two Neulander fronts enough so that they'll pause to bring up more men, before starting to go forward against us, again. Do you think we can do that much?"

"Hm-m-m," Eachan fingered his moustache. "Something like that . . . yes, quite possible, I'd think."

"Good," said Cletus. "Now can you get me through, preferably with picture as well as voice, to Marc Dodds?"

"We're on open channel," Eachan answered. He stepped across the room and returned with a field phone.

"This is Colonel Khan," he said into it. "Colonel Grahame wishes to speak with Colonel Dodds."

He passed the phone to Cletus. As Cletus's hands closed about it, the vision screen in the phone's stem lit up with the image of Marc's face with the plotting screen of the aircraft behind him.

"Sir?" Marc gazed at Cletus. "You're in Bakhalla?"

"That's right," Cletus answered. "And so's that company of men I had you send to meet me at the bend of the main river. Give me a view of the board behind you there, will you?"

Marc moved aside, and the plotting screen behind him seemed to fill the full screen of the phone. Details were too small to pick out, but Cletus could see that the two main bodies of Neuland troops were just beginning to join together on the sandy plain that began where the river bluffs on adjacent banks of the converging Blue and Whey rivers finally joined and ended in a sloping V-pointed bluff, above the town. Behind the forward scouts, the advancing main line of the Neulanders was less than a half a mile from the forward Dorsai strong points defending the town. Those strong points and the defending Dorsais would be firing into the enemy at long range, even now.

"I've got men along the tops of the bluffs all the way above the Neulanders on both rivers," said the voice of Marc, "and I've got at least two energy-rifle companies down on the flats at the foot of the bluffs behind their rearguards, keeping up fire into them."

"Pull those rifle companies back," Cletus said. "There's no point in risking a man we don't have to risk. And I want you to have your men on top of the bluffs stay there, but slacken off on their firing. Do it gradually, cut it down bit by bit until you're just shooting into them often enough to remind them that we're there."

"Pull back?" echoed Marc. His face came back into the screen, frowning. "And slacken fire? But what about the rest of you down in the town there?"

"We're going to attack," said Cletus.

Marc stared out of the screen



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without answering. His thoughts were as visible as if they had been printed in the air before him. He, with better than three thousand men, was being told to back off from harassing the rear of an enemy of more than six thousand—so as not to risk casualties. Meanwhile, Cletus, with less than six hundred men, was planning to attack that enemy head-on.

"Trust me, Colonel," said Cletus into the phone. "Didn't I tell you all a week ago that I planned to get through this battle with as few men killed as possible?"

"Yes, sir . . ." said Marc, grudgingly, and obviously still bewildered.

"Then do as I tell you," said Cletus. "Don't worry, the game's not over yet. Have your men slacken fire as I say; but tell them to stay alert. They'll have plenty of chance to use their weapons later."

He cut the connection and handed the phone back to Eachan.

"All right," he said. "Now let's see about mounting that attack."

Thirty minutes later, Cletus was riding with Eachan in a battle car that was sliding along on its air cushion ten inches above the water flooding the town—water that was now a good ankle's-depth, even here at the upper edge of the town. Moving ahead of him, spaced out in twenty-yard intervals, and making good use of the houses, trees and other cover they passed, he could see the closest half-dozen of his Dorsai troopers in the first line of attack. Immediately in front of him, in the center of the control panel of the battle car, he could see a small replica plotting screen being fed with information by a remote circuit from the main plotting screen under Eachan's control at Dorsai HQ in the town behind him. It showed the Neulanders forming up at the base of the vertical wall of stone and earth where the adjacent river bluffs came together. Their line stretched right across the six hundred-odd yards of sandy soil making up the neck of land which connected the foot of the bluffs with the broader area of slightly higher ground on which the town of Two Rivers was built.

The width of that neck of land, however, showed only on the plotting screen. Its actual width was lost now in an unbroken sheet of running water stretching from the bluffs on what had been the far side of the Whey River to the opposite bluffs on what had been the far side of the Blue. Under that gray flowing sheet of liquid, it was impossible to tell, except for the few small trees and bushes that dotted the neck of land, where the water was ankle deep and where it would have been deep enough for one of Wefer's Mark Vs to pass by on the bottom, unnoticed. Cletus had warned the attacking men to stay well toward the center of the enemy line, to avoid blundering



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into deeper water that would sweep them downstream.

The attackers paused behind the cover of the last row of houses and dressed their line. The enemy was only a few hundred yards away.

"All right," said Cletus into his battle phone. "Move out!"

The first wave of attackers rose from their places of concealment and charged forward at a run, zigzagging as they went. Behind them their companions as well as the strong points with a field of fire across the former neck of land, opened up on the enemy with missile weapons.

The Neuland troops still standing on the dry footing of the slightly higher ground at the foot of the bluffs, stared at the wild apparition of rifle-armed soldiers racing toward them with apparent suicidal intent in great clouds of spray. Before they could react, the first wave was down behind whatever cover was available, and the second wave was on its way.

It was not until the third wave had moved out, that the Neulanders began to react. But by this time the fire from the attackers—as well as the slightly heavier automatic fire from the strong points was beginning to cut up their forward lines. For a moment, disbelief wavered on the edge of panic. The Neuland troops had been under the impression that there was no one but a token force to oppose them in Two Rivers—and that it would be a matter of routing out small pockets of resistance, no more. Instead, they were being attacked by what was clearly a much greater number of Dorsais than they had been led to believe were in the town. The front Neuland line wavered and began to back up slightly, pressing in on the troops behind them, who were now crowding forward to find out what was going on.

The confusion was enough to increase the temporary panic. The Neuland troops, who had never fought a pitched battle before for all their Coalition-supplied modern weapons, lost their heads and began to do what any seasoned soldier would have instinctively avoided doing. Here and there they began to open up at the charging figures with energy weapons.

At the first touch of the fierce beams from the weapons, the shallow water exploded into clouds of steam—and in seconds the oncoming Dorsais were as effectively hidden as if the Neulanders had obligingly laid down a smoke screen for their benefit.

At that, the panic in the first few ranks of the Neulanders broke completely into a rout. Their forward men turned and began trying to fight their way through the ranks behind them.

"Back!" Cletus ordered his charging Dorsais by battle phone. For, in spite of the temporary safety of the steam fog that enve-



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loped them, they were now dangerously close to the mass soldiery of the Neulanders force, as his plotting screen reported, even though vision was now obscured. "Get back! All the way back. We've done what we set out to do!"

Still under safety of the steam fog, the Dorsais turned and retreated. Before they were back to the cover of the houses, the steam blew clear. But the Neulander front was still in chaos, and only a few stray shots chased the attackers back into safety.

Cletus brought them back to Dorsai HQ and climbed stiffly out of the battle car whose air cushion hovered it above more than seven feet of water, now lapping at the top of the steps leading to the main entrance of the building. He made a long step from the car to the threshold of the entrance and limped wearily inside toward the Command Room.

He was numb with exhaustion and he stumbled as he went. One of the younger officers in the building stepped over to take his arm, but Cletus waved him off. He limped shakily into the command room, and Eachan turned from the plotting screen to face him.

"Well done, sir," said Eachan slowly and softly. "Brilliantly done."

"Yes," replied Cletus thickly, too tired to make modest noises. On the screen before him the Neulanders were slowly getting themselves back into order. They were now a solid clump around and about the foot of the bluff. "It's all over."

"Not yet," said Eachan. "We can hold them off a while yet."

"Hold them off?" The room seemed to waver and threaten to rotate dizzily about Cletus's burning eyes. "You won't have to hold them off. I mean it's all over. We've won."

"Won?"

As if through a gathering mist, Cletus saw Eachan staring at him strangely. A little clumsily, Cletus made it to the nearest chair and sat down.

"Tell Marc not to let them up to the top of the bluffs unless they surrender," he heard himself saying, as from a long way off. "You'll see."

He closed his eyes; and seemed to drop like a stone into the darkness

"Medic, here!" Eachan was snapping. "Damn it, hurry up!"

So it was that Cletus missed the last act of the battle at Two Rivers. From the moment of the Neulanders momentary panic at being attacked by the Dorsais under Cletus's direction, trouble began to beset the six thousand soldiers from Neuland. It took them better than half an hour to restore order and make themselves ready to move forward upon the town again. But all that time the river level, raised



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by the work of Wefer's Mark Vs, had been rising. Now it was up over the knees of the Neulanders themselves; and fear began to lay its cold hand upon them.

Ahead of them were certainly more Dorsai troops than they had been led to expect. Enough, at least so that the Dorsais had not hesitated to attack them. To go forward might cause them to be caught in a trap. Besides, to go forward was to go into steadily deepening water. Even the officers were uncertain—and caution suggested itself as the better part of valor. The word was given to withdraw.

In orderly manner, the two halves of the Neuland invading force split up and began to pull back along the river flats down which they had come. But, as they backed up, the width of the flat narrowed in each case; and soon the men farthest away from the bluff found themselves stumbling off into deeper water; and the current pulled them away.

As more and more Neuland troopers were swept out into the main river current, struggling and splashing and calling for help, a new panic began to rise in the ranks of those still standing in shallow water. They began to crowd and jostle to get close to the bluff. Soon their organization began to dissolve. Within minutes, individual soldiers were breaking away from the ranks and beginning to climb directly up the bluffs towards the safety of high ground overhead.

But it was at this moment that Marc, following Cletus's earlier written orders, gave the command to his Dorsais lined up along the top of the bluff to fire down into these refugees from the rising waters. And it was all over but the shouting.

They did not even have to call on the Neulanders to surrender. The panic-stricken colonists in uniform from over the mountains beyond Etter's Pass threw away weapons and began climbing the slope hands in the air, at first by individuals, and then in mobs. By the time the sun was touching the western horizon, more than six thousand former soldiers—as it was later to turn out, better than seventy percent of Neuland's native army—sat huddled together as prisoners under the guns of their Dorsai guards.

But Cletus, still unconscious, knew none of this. Back in a room of the Dorsai HQ in Two Rivers, a prosthetic physician flown up from Bakhalla was straightening up from his examination of Cletus's swollen left knee, his face grave.

"How is it, Doctor?" asked Eachan Khan, sharply. "It's going to mend all right, isn't it?"

The physician shook his head. "No, it isn't. He's going to lose the knee."

TO BE CONTINUED



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# THE REFERENCE LIBRARY

*P. Schuyler Miller*

## UNDER THE MOONS OF MUNSEY

We patriarchs of First Fandom—not a beard in the crowd, as far as I know—rather pity the young and bearded generation that never knew the all-fiction magazines—the "pulps." Those were the days before television when people read for pure enjoyment, and the all-fiction and largely-fiction magazines were the equivalent of today's paperbacks, except that they gave you things most paperback books—except in the SF field—do not. Variety in authors, themes, styles was one: editors worked hard to have something for everyone in every issue of *Argosy, Adventure, Blue Book, Top-Notch.* Price was another: you paid a dime, or a quarter, for what costs five or six times as much now. And there were the serials—five or six of them running simultaneously, with a new part coming out every week. There were supposed to be old-timers who refused to die until they read the final installment of the yarn they were following.

Sam Moskowitz, as I hope you know, is assembling and editing a running chronicle of science fiction and fantasy in the magazines. In his earlier survey of the entire field, he gave us books in pairs: one of biography and history, the second of typical stories. "Explorers of the Infinite," which took the chronicle from the beginning into the 1930s, was matched with "Masterpieces of Science Fiction"; "Seekers of Tomorrow," which came down almost to the present, had "Modern Masterpieces of Science Fiction."

Perhaps the readers who wanted the history didn't need the stories, and those who bought the anthologies were bored by the history. At any rate, his publisher, World Publishing Company of Cleveland, has switched to a new format with stories and background in the same book. "Science Fiction by Gaslight" (1968) was an account of the part science fiction and fantasy—the two were really not separated in their authors' or readers' minds—played in the popular magazines of 1891-1911. Now he continues the chronicle in a new book, "Under the Moons of Mars" (World; 433 pp.; $7.95), an account of the era when the Munsey magazines dominated the field.

Whereas, in "Science Fiction by



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Gaslight," we were first given a rather condensed history of the magazines, their publishers, and the authors who experimented with what we now call science fiction, followed by a rich selection of almost unknown short stories and novelettes, the publisher has turned the new book inside out. First come the stories, each with a brief introduction about the author. Then comes a history of the Munsey magazines, in which the stories appeared, interwoven with a running account of what their principal competitors were doing, in the era from 1912 to 1920.

Because the stories will be more familiar to most readers, five of the nine are excerpts of serials rather than complete short fiction. We get them in their original magazine version: a bit from Edgar Rice Burroughs' "Under the Moons of Mars," better known to book readers as "A Princess of Mars"; the beginning of George Allan England's "Darkness and Dawn," which grew into the huge trilogy recently reprinted in a bowdlerized version by Avalon; and scraps of Charles B. Stilson's "Polaris of the Snows" and Dr. J. U. Giesey's "Palos of the Dog Star Pack," both of them also the openers for trilogies reprinted by Avalon.

Present-day readers may not know that some of the classic novels of the World War I period were first published in the Munsey magazines as lengthy novelettes—what would now be classed as "novellas"—followed by a book length serial—the whole to be fused into the book version. We get two of these curtain-raisers: A. Merritt's "The Moon Pool" from *All-Story Weekly* for June 22, 1918 and Ray Cummings' "The Girl in the Golden Atom" from the same magazine ten months later, March 15, 1919. I'd have preferred one of Merritt's lesser known—and rarer—short stories, such as "The People of the Pit." It would give the book more than purely historical interest.

We do get one "unknown," and a good one—"Friend Island" by Mrs. Gertrude Bennett, who made a name for herself as "Francis Stevens." Her story parodies the then vigorous "Rights for Women" movement by projecting a future when women dominate the world and men keep house. It is a typical old seadog yarn about a terribly strange island which couldn't put up with a boorish male castaway but grew very fond of a shipwrecked seawoman. Fantasy, yes, but not dated in the least.

We also have the original version of "The Mad Planet," by the man who links that era with our own and has been a major figure for the whole half-century, William F. Jenkins, alias "Murray Leinster." I still prefer this version to the later revision, made when it was combined with its sequels to make a book. It takes us to a future world of gigan-



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tic insects and fungi, where a little human being fights valiantly to survive. Murray Leinster has always been as good as he still is.

The sample shop closes its doors on excerpts from "The Blind Spot," by Austin Hall and Homen Eon Flint. I like the book, as most people don't, but I'd rather have seen one of Flint's little-known short stories. SaM outlines them in his history.

This historical outline is really the meat of the book and an excursion in nostalgia. I didn't discover *All-Story* until some time after 1924, when it had been combined with *Argosy* as *Argosy All-Story Weekly* and provided the grandest fictional feast for 10 cents that you've ever seen. But the stories that SaM mentions here are the stories older readers remembered in my time. Some I later managed to locate; others I still have never seen.

The theme on which SaM bases this section of his history—and he is very convincing—is that after 1912, and "Under the Moons of Mars," Edgar Rice Burroughs and the Munsey magazines controlled the course of what became science fiction a little later. The kind of pseudoscientific or fantastic/occult adventure story that Burroughs wrote in his "Mars" series proved to be tremendously popular. Frank A. Munsey and his several editors, especially Bob Davis and Thomas Metcalfe, encouraged their most reliable writers to try the genre and hunted for new authors who could handle it. Their competitors imitated them and developed stables of writers of their own. Without this era of development, there might have been no writers able to produce new science fiction when, in 1926, Hugo Gernsback launched *Amazing Stories* as the first all-science-fiction magazine. It was a great era.

There are minor auctorial/editorial annoyances. The book will be a standard reference for a long time, and it badly needs an index. Stories are occasionally listed without identifying authors. I've said that I would have preferred little-known short stories to these chunks of novels: that may have been SaM's choice or it may have been the publisher's. At any rate, let's hope he carries on from 1920 into the era I do remember. It was great, too.

## THE MOON AS VIEWED BY LUNAR ORBITER

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Privately published, it would probably be a $25 volume. J.W.C.

### WHIPPING STAR

*By Frank Herbert • G. P. Putnam's Sons, New York • 1970 • 186 pp. • $4.95*

Detective stories and science fiction are expected to conform to quite different codes. In a "good" mystery, the average reader must know the rules of the game and be able to identify and interpret clues on the basis of his general knowledge of the world and what is in it. In science fiction, the rules of the game and often the very nature of


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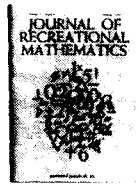


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the game are part of the mystery, and the reader has to draw on a special knowledge of science, some experience with the conventions and stereotypes of the field, and any hunches he can muster.

"Whipping Star," expanded from the *If* serial of a few months ago, is a beautifully intricate science-fictional mystery. I don't think it is giving away too much to say that its detectives have, among other things, to deduce the basic nature of the universe. You and they will be halfway through the book before you begin to know what the questions are for which you are getting fragmentary answers.

The principal 'tec—and I hope we see more of him—is one Jorj X. McKie, Saboteur Extraordinary. He is assisted by individuals of many and amazing species, all members and officials of the Bureau of Sabotage. (When the entire galaxy is enmeshed in one bureaucracy, sabotage must be institutionalized as a check on the runaway actions of other agencies.) The worlds are in instant contact through a system of "jumpdoors"—a familiar enough concept in SF—and in communication through the medium of the peculiar beings known as Taprisiots. But in this version of the universe, the jumpdoors are maintained and controlled by even stranger invisible beings known as Calebans. (You have no idea how strange!) One by one the Calebans are vanishing—and by devious means BuSab learns that when the last Caleban goes, every sentient being who has ever used a jumpdoor will cease to exist. That one last Caleban is under contract to a psychotic female tycoon who is slowly and gleefully whipping it to death. She has reason to believe that she and a perverted group she has gathered around her have discovered a refuge which will exempt them from the dissolution of civilization.

That she is wrong is only one of the things McKie eventually discovers in the course of a long, fascinating, and utterly frustrating confrontation with the Caleban, "Fanny Mae," with Mliss Abnethe doing her best to destroy him all the while. How to communicate with a Caleban? How to interpret what you think it has told you? How to find clues to Abnethe's whereabouts in a situation carefully constructed to be clueless? How to employ the thoroughly peculiar natures and customs of a series of alien races to achieve one human purpose? These are all questions he must answer before Fanny Mae is whipped to death.

It's a far more complex construction than Herbert's classic Dune World, if not so thoroughly realized. There he showed you a world and its people; here he is hiding them from you. The result may not be "fair" by detective-story criteria, but it's grand SF.



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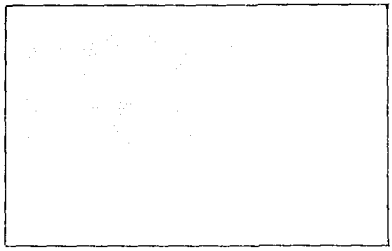

Dear Sir:

A few years ago I owned a calendar that told the weather for the day right under the date. It wasn't one hundred percent reliable but it was more reliable than the U.S. Weather Bureau. If the calendar said rain and the newspaper said clear skies, it would rain that day. There might not be a cloud in the sky in the morning but by the time I left school that evening I would need the raincoat I had brought. (This happened on, at least, two occasions.)

Alas, the year ran out and so do calendars. I have been trying since then to find the maker of that calendar so that I might order another. My mother threw it out at the end of the year so I never did get the name. (One never knows what is really useful until he has to do without!) Maybe some of your readers know such a manufacturer. I can do without the advice to the lovelorn and what to invest in. All I want from astrology is the weather report!

One other item. Remember Donal Graeme in Gordon R. Dickson's "Dorsai"? Such a talent as he had might not properly develop in a "normal" society. You see, I know a guy who just might be able to use intuition like some people use logic. He can look at a chemistry problem and tell you the answer almost right away. But don't ask him how. This goes for a lot of his other classes. He actually fills in the answers before going back to do the problems by logic. He has problems with his homework because of that. I suppose the profs want to cut down on cheating by requiring the work along with the answer, but you can see what this would do to a talent. Getting the right answer is not enough. One must do it the approved way.

I don't know if he'll be able to use this when he leaves school. Knowing how our society favors "adjustment" I doubt it. The Dorsai must have been very broadminded. But then, one must be brave to be broadminded.

Aside from telling you that I enjoy your mag, how about a few more by James Schmitz?

Raul Reyes

1915½ Addison Street

Berkeley, California

*The* Old Farmer's Almanac, *may be? And Jim Schmitz has several coming up!*

Dear Mr. Campbell:

It has taken quite a while to get around to this letter, but I have to comment on John Phillifent's reply



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to an earlier Brass Tacks letter.

First off, it's obvious that Mr. Phillifent isn't too well versed in evolutionary theory. All species *do* come from "one original breeding stock." Individuals in a population do not evolve, the population evolves. It was the proto-hominid populations that evolved toward man, competed with each other and only one won.

To get to the main point, though, Mr. Phillifent implies that if a duplicate Earth were circling Tau Ceti, or some other GO dwarf, the dominant species would be an *identical* duplicate to *Homo sapiens.* Now, you explained quite adequately in an editorial a few years ago, what features would probably exist in such a king-species: bipedalism, cephalization (growing a head), stereoscopic vision, et cetera. That's called convergent evolution—similar functions require similar organs. But to imagine that interbreeding could take place . . . well it's conceivable, but damn unlikely.

Take the optical rotation of biochemicals. Our carbohydrates rotate plane-polarized light in a clockwise direction, and our amino acids, the bases for proteins, rotate it counterclockwise. Chemically *identical* substances which rotate polarized light in the opposite direction of our metabolites are totally useless (even poisonous) to Terrestrial organisms. If two sets of gene, each acting on the opposite type of one such biochemical, were to exist in a fertilized ovum, the zygote wouldn't last 15-20 seconds.

But let's assume that this obstacle doesn't arise. Does this mean that Father Murphy had better check into Klono's marriage rites? No way. The processes of mitosis, meiosis and syngamy (cellular fission, fission with reduction in the number of chromosomes and fertilization—bringing the number of chromosomes back to normal) are so precise, so exacting, that the slightest of hundreds of possible chromosomal aberrations will cause death within a few days or weeks at most. Does he really think that alien *chromosomes* are going to be the same number, size, shape and so on??

It's going to be hard, never being captured by those man-hungry, bikini-wearing, blaster-toting girls from Alpha Centauri IV everyone thinks is the best SF can do, but that's the way it goes.

Stephen Noe

437 Stanford
University of Notre Dame
Notre Dame, Indiana

*Perhaps I should just say "Noe is right!"*

Dear John:

Analog remains for me the most idiosyncratic, potty and incomprehensible of all the sf magazines and I continue to admire it in my puzzled way even if I can't understand the stories. And P. Schuy-



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ler Miller remains the best and most sensible critic to write a regular column in an sf magazine. I liked his review of my book, "The Final Programme."

However, on behalf of myself and the other writers who have produced Cornelius stories, I would like to ask you to make it clear that Mr. Miller was not suggesting that we were habitual drug takers when he said in the last paragraph of his review: "One question is worth raising, though: if the 'real' universe is what it seems to us to be—and that is a perfectly respectable SF postulate—what is the real universe of someone stoned on hallucinogenic drugs?"

Several of the writers were upset at the suggestion that they might be LSD or Mescalin eaters since, of course, it is illegal to possess these drugs except in special instances. They would like it made quite clear that they prefer to confine themselves to literary and not "psychedelic" experiments.

Mike Moorcock

(On behalf of Brian Aldiss, James Sallis, Langdon Jones, Norman Spinrad, Maxi Jakubowski, M. John Harrison, R. G. Jones)

*I think Miller was raising a question somewhat along the lines of the Pratt-de Camp series of alternate-universes in the old* Unknown, *which Harold Shea investigated.*

Dear Mr. Campbell:

I am pleased to report that I successfully decoded the title of Larry Perkins' yarn in the April issue *before* reaching the denouement (Mother always said I'd do well.) It's *"Communications,"* or I'm a moon keys: ankle!

So where's my cue ped all?

Kenneth R. Tidwell

2911 Brinwood Avenue

Austin, Texas

*Sea ladle gull ooze righting hour ladders muss avenue sup lie summers—*

Dear Mr. Campbell:

Mr. Phillifent neglects the third explanation for the similarity of living molecules on Earth: the seeding of the Earth by extraterrestrial (or cosmic) spores. In this case, you won't find vestiges of second and third runs either. In fact, I find the preceding explanation more palatable than the assumption that only one combination of molecules is viable here.

A. Baidins

1104 Windon Drive

Wilmington, Delaware 19803

*Could be—but why did it get started wherever it did start?*

Dear Mr. Campbell:

At present I am a college senior at McGill University in Montreal. I have read your excellent magazine for over five years and I feel that I can accomplish my ends by an appeal to you and your readers. I have been trying to establish one or several courses in Science Fic-



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tion/Fantasy at my University. There has been an initial response but much more information is required.

I would like to appeal to your readers to inform me of any universities that presently teach courses in Science Fiction and the professor concerned so I can get in touch with him or them, re such matters as course content, textbooks, general readings, anthologies and other useful topics.

I believe that there are several ways this can be taught. The way I propose is to have several courses, some lasting one year and others lasting one semester, covering different aspects of the topic. Examples of these courses might be:

*Introductory Science Fiction:* An introduction to the great Science Fiction writers of the past, present and future.

*Developments of Science Fiction:* The development of Science Fiction split up into the following divisions: (1) up until 1900, (2) 1900-1930, (3) 1930-1950, and (4) 1950-present.

*Science Fiction of the Present:* The influence of psychology, adventure, and the fantastic on modern Science Fiction.

*Future Directions of Science Fiction*: A discussion of new possibilities for Science Fiction in the future.

*Great Writers:* A course dealing with the lives and works of past masters, such as Verne, Wells, Asimov, Ballard, E. E. Smith, et cetera.

I would appreciate any correspondence, comments, or suggestions from your readers. As an additional request, who is Sam Moskowitz's publisher and where can one purchase the hard-cover editions of his many books on the history and development of Science Fiction?

JOHN EVANS

457 High Street
Orilla, Ontario, Canada

*Readers, please write to Mr. Evans. Sam Moskowitz's books on the history and development of science-fiction were published by and are available from The World Publishing Company, Cleveland, Ohio.*

Dear Mr. Campbell:

Very good editorial in the May '70 issue, but I rather expect that of you every month.

But you did leave off two of my favorites: Tax collectors and building inspectors. A pair of slum dwelling pests, and responsible for a goodly number of slums.

In most cities, a building erected before an ordinance was passed is not subject to that code. However, in a large number of cities, if a major improvement is added, the building falls subject to the code as it exists at that time.

Ho, ho, make an improvement and lose your property!!

Next, the building inspection code never keeps pace with the im-



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provements in the technology. A good example of something called the law of bureaucrats and technology. Therefore, if you are trying to add an improvement which was invented after the last issue of the building code, you got a hell of a problem!! You gotta tell a bureaucrat that everything is not in his magic book—he probably will not believe you.

Now, if you get to improve your inner city property, the tax man will come and put the bite on you. In Philadelphia, a few years ago—it might still be that way now—the tax structure was a killer. They taxed you on everything—property improvements, inventory, cash, et cetera.

As a result, the less you had, the less you got taxed, and the more you made.

What eco-niche do these creatures fit, parasites?

JOE CELKO

Box 11023
Atlanta, Georgia 30310

*Where there is a living to be made, something will crawl in to live.*

Dear Mr. Campbell:

Some time ago, you stated that research should be promoted in the area of differences in intelligence caused by racial characteristics. Also, you deplored the closed-minded attitudes of some scientists—and their organizations—in condemning such research. It all seemed like personal ax-grinding.

Normally, I keep my mind as open as I can without being accused of having a hole in my head. In spite of that, I have a deep dread of anything of a racist, or potentially racist, nature. In addition to this handicap, I felt that racial research was not in my line at all, and that it was none of my business.

The recent Southern Arizona Science Fair, for young students, had several closed exhibits toward the end of the exhibition. Some of them were closed because of dangerous or malfunctioning equipment. One closed exhibit had no equipment to go with it. All of the pertinent material was on a display board that was folded up by the exhibitor, a judge, or a spectator. The exhibit reported an experiment to determine whether there was a correlation between race and intelligence.

The person who closed that exhibit demonstrated to me that the reason for lack of research in this field is not the lack of funds or importance, but the "need" for protracted ignorance. The young science student who set that display up has now learned not to "buck the system." We have lost a creative sociologist.

CHARLES R. WATSON

1358 Rollercoaster Road
Tucson, Arizona 85704

*The old proposition "There are things it is better Men should not know," maybe?*



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## THE NOW GENERATION

*continued from page 7*

Typically, the Now Generation has been demanding that Nixon end the war in Vietnam *RIGHT NOW!* They're demanding that Daddy stop what he's doing and make the problem go away immediately!

I have a proposition for these brilliant, wise, competent, far-seeing, understanding Now Generation anti-war hotshots. Somewhere among them there must be some Business Administration students who have training in how to plan an operation. The real red-hot SDS-type Protestors have a remarkably small percentage of engineering students, which will handicap them somewhat, but they do have a few.

With all this talent available, they should draw up a workable plan of *how* to get the U.S. troops out of Vietnam *right now*.

How do they propose to move 350,000 men across an ocean?

Oh . . . I see. That's not *their* problem, that's for Daddy-the-Establishment to do. Just as Mary wanted a horse, and it wasn't her problem how to pay for it—that was for Daddy to figure out and do.

O.K.—so stop being a ten-year-old, and try working out a workable plan. Stop howling for Daddy to solve all the problems—stop assuming that of *course* he could do it and all you have to do is throw enough tantrums to make him. Try using that now-adult intelligence you claim to have, and figure out *how* it can be done.

In the real world, the Banderlog Technique doesn't work—the technique of "Something great and noble and new, Done by merely wishing it true!" Presidential fiat won't alter the law of gravity, nor will it alter the laws of economics, logistics, or tactics.

The last time an army was withdrawn by sea from a hostile countryside was in 1940; the Now Generation doesn't like history, and so wouldn't be interested in what happened at Dunkirk—unless they've got guts enough (I doubt it) to try to figure out a practical, operational plan for withdrawal from Vietnam "right now." You want it done? O.K.—*how can it be done?* You're sure it's easy? Show us stupid elders how! It's our job, not yours?

Then stop trying to tell us how to run the world; you're saying "I don't know how to do these hard things—you do 'em!" You're still a child howling for "Daddy!" to solve the problems you want handled. And kicking Daddy in the shins because he doesn't do it fast enough to suit you brats.

So far as I can make out, very few of the Now Generation have ever gone fishing. (It takes three things they tend to lack; patience,



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self-discipline, and willingness to learn a new viewpoint—in that case, a fish's.) However they've read about fishhooks. Now if you should get a fishhook in your thumb—an accident that happens every now and then—the best way to get it out again is not one that a child ever willingly accepts. You cut off the shank of the hook, with the loop where the line is tied on, and push the hook the rest of the way through your thumb. You do *not* pull it back out.

The barbs on the hook have fairly sharp forward edges—that's why it slipped in so suddenly! But the back of the barbs are specially designed to anchor themselves in tissue and stay there—to gouge and tear. Try backing that thing out and the wound will be twenty times worse. It's especially designed to go forward, and *not* backward.

So the best way out is to go in deeper.

The same rule can apply to a lot of other things.

The best way to pull out of Vietnam is to get the South Vietnamese to cover our withdrawal. If we don't have that—it'll be the horror of Dunkirk again, only instead of trying to withdraw across a narrow English Channel we're trying to withdraw across an ocean.

Go on, oh brilliant sages of the Now Generation! Think a *means* instead of howling a demand! Either acknowledge that you're incompetent and have to rely on Daddy-Establishment to solve your miseries—or work out a plan that will work!

Now if you think about it a bit, it'll be reasonably clear that the South Vietnamese will not automatically help us run out and leave them to face the Communists alone. We may well feel "Oh, a plague on both your houses!" but *they* don't. And we need somebody as a rear guard while we're withdrawing our 350,000 men. Or—do you want to volunteer to be left behind to cover the retreat? Quite a few of the British accepted that duty at Dunkirk, you know.

The invasion of Cambodia was pushing the fishhook the rest of the way through. It's made a terrific change in the morale of the South Vietnamese, for one thing. As to actually spreading the war—hmm-m, that's open to question, inasmuch as the North Vietnamese were fighting there already, as well as in Laos and Thailand.

If you open a package of meat and find it crawling with maggots—it isn't opening it that put the maggots there! They'd been there for some while—opening it just exposed the fact.

By pushing on through into Cambodia, immediately available supplies the Vietcong depended on were made distinctly unavailable. If some of the Now Generation Business Administration students discuss this in a how-to-get-out-of-Vietnam planning session, the



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louse-up of logistical supplies may become more understandable. The value of a pound of rice at the end of a jungle trail is perhaps twenty times what it was at the starting end. And shipping a machine gun from a Russian factory overland to a Cambodian supply dump, via the Ho Chi Minh Trail makes it quite expensive—in human-effort terms, not merely money.

The resultant loss of supplies and organizational arrangements makes the process of withdrawal from Vietnam a damn sight easier.

If the kids would just stop howling for Daddy-Establishment to do what they just *know* should be done, and *right now*, like a bunch of ten-year-old brats, and start working out ways and means of doing it—if they'd accept responsibility for *how* instead of simply saying "We know best; you do what we say and stop delaying!" they would be fit to have a major voice in the world.

So long as they act like children, and reject the responsibility of solving the hard problems of *how*, they have no business saying they are full adults.

They say "Don't trust anyone over thirty!"

All right—let's see how the under-twenty group does, and consider whether they can be trusted.

Shall we take a look at Kent State, for instance—where frustrated brats in the 17-22 year age group threw a tantrum and burned down buildings and smashed up businesses in the town because they weren't getting what they wanted the way they thought they should. (Without bothering to understand why Nixon ordered the Cambodian attack. They didn't need to, of course, because they'd already made up their minds, and who needs data when you've already decided?) So they reacted with furious emotionalism.

On the other side, we have a bunch of young Guardsmen, mostly of the same age group, who also reacted with furious emotionalism—panic, in their case—and killed some of the students.

And it is this group that the 18-year-old voters will add to the voices determining our national policy. The voices of destructive tantrums that burn down buildings, run home-made bomb factories, attack bank buildings—these are the voices of reason and understanding that panic and shoot opponents when they feel threatened.

The Now Generation, who insists nobody listens . . . while they attend rock-and-roll discothèques where the noise level is so high that not only is hearing impossible there, but permanent impairment of hearing results. The Now Generation likes to set up communication blockades, apparently; they seem to be very poor listeners.

Typical pattern of angry children, isn't it? The Editor.



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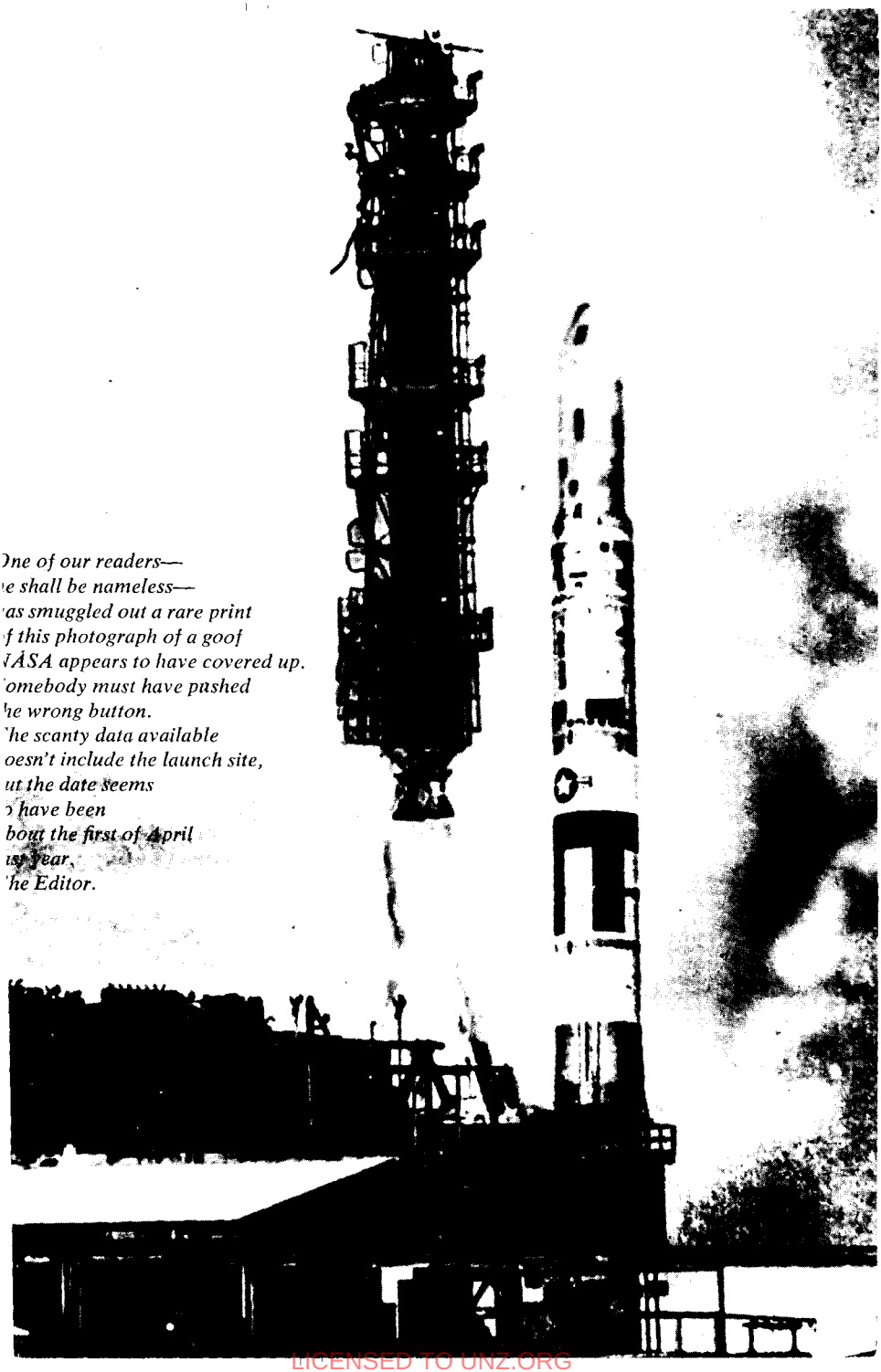

*One of our readers—*
*We shall be nameless—*
*Was smuggled out a rare print*
*Of this photograph of a goof*
*NASA appears to have covered up.*
*Somebody must have pushed*
*The wrong button.*
*The scanty data available*
*Doesn't include the launch site,*
*But the date seems*
*To have been*
*About the first of April*
*This year.*
*The Editor.*

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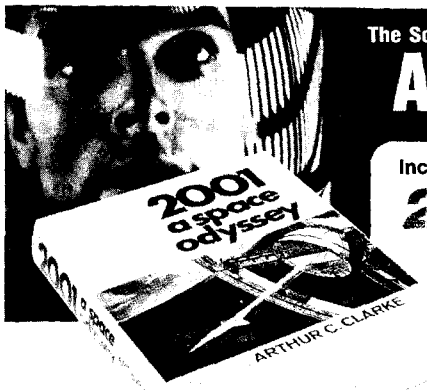


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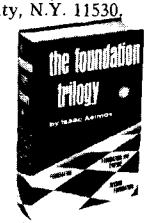


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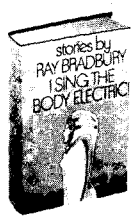


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